Biological Assessment Report

East Fork Black River Macroinvertebrate Community Assessment

2007 Sample Data Annual Report

Reynolds County, Missouri

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1.0 Introduction

In an effort to maintain a continuous record of the macroinvertebrate community's response to the AmerenUE Upper Taum Sauk Reservoir failure and East Fork Black River (**East Fork, EFBR**) restoration efforts within Johnson's Shut-Ins State Park (**JSISP**), samples were collected in 2007 by the Environmental Services Program's (**ESP**) Water Quality Monitoring Section (**WQMS**). As in previous studies (Sarver and Michaelson 2005, Michaelson 2007), macroinvertebrate and water quality samples were collected upstream and downstream of the park, in two EFBR tributary stations, and in three mainstem Black River stations. Dave Michaelson and Brandy Bergthold collected spring macroinvertebrate samples from these 12 stations on March 13-15 and March 20, 2007, with Dave Gullic collecting water quality samples from these sites on March 13-14, 2007. Dave Michaelson, Carl Wakefield, and Dave Gullic collected fall macroinvertebrates on September 17-19, 2007. Dave Gullic collected the water quality samples prior to macroinvertebrate sampling on these days.

As a result of the December 2005 Upper Taum Sauk Reservoir failure, the original East Fork Black River channel within JSISP was filled with sand-sized sediment and a secondary channel bore the main flow. To address sediment issues in areas such as Station 6 (known as the "West Channel") and Station 7 (the undersized secondary channel known as the "East Channel"), a multi-agency work group tasked AmerenUE with providing a comprehensive solution. In January 2007 AmerenUE's contractor, MACTEC Engineering and Consulting Inc., initiated the construction phase of the plan agreed to by the work group (MACTEC 2006) to establish a more naturally appearing and functioning river system through JSISP. During the winter and early spring of 2007, Station 6 was within a portion of the floodplain that was systematically isolated from flow, dewatered, and reshaped to create the new river channel. The East Fork Black River was introduced into its new channel in April 2007, after the spring macroinvertebrate sample season had been completed. As a result of the stream restoration project, the river reach that served as Station 7, the "East Channel," has reverted back to its original function as a secondary high flow channel. The fall 2007 sample season was the first to document the initial macroinvertebrate recolonization phase for the restored river reach.

2.0 Study Area

The East Fork Black River watershed originates in northeastern Iron County near Graniteville, Missouri and Elephant Rocks State Park. It flows southwest from its source to the Imboden Fork confluence just north of Johnson's Shut-Ins State Park. From this point, it flows south through JSISP and the AmerenUE Lower Taum Sauk Reservoir to its confluence with the Black River near Lesterville, Missouri (see map, Appendix A). The approximately 94-mi^2 watershed is mostly rural, with 92% composed of forested land cover (Table 1). The assessed stream reach is classified in the Missouri Water Quality Standards (MDNR 2005) as a Class P stream, with designated uses that include

Livestock and Wildlife Watering, Protection of Warm Water Aquatic Life, Whole Body Contact, and Drinking Water Supply.

The East Fork Black River is located within the Ozark/Black/Current Ecological Drainage Unit (**EDU**). An EDU is a region in which biological communities and habitat conditions can be expected to be similar. Maps of the EDU and the local sampling locations can be found in Appendix A. Table 1 compares the land cover percentages from the Ozark/Black/Current EDU and the 14-digit Hydrologic Unit Code (**HUC**) that contains the sampling reaches of the East Fork Black River. Percent land cover data were derived from Thematic Mapper satellite images from 2000-2004 and interpreted by the Missouri Resource Assessment Partnership (**MoRAP**).

Table 1
Percent Land Cover

	Urban	Crops	Grassland	Forest
Ozark/Black/Current EDU	1.0	0.0	23.0	72.0
HUC 14 #11010007030002 (Hwy 21 – Hwy N)	0.0	0.0	4.0	91.0
HUC 14 #11010007030001 (Upstream of Hwy N)	0.0	0.0	4.0	93.0

3.0 Site Descriptions

All of the following sample sites were in Reynolds County, Missouri.

East Fork Black River Station #1 (SE ¼ sec. 16, T. 32 N., R. 2 E.) was the most downstream station on East Fork Black River and was located immediately upstream of the Highway 21 bridge at Lesterville, Missouri. Geographic coordinates of the downstream terminus of the sampling reach are UTME 692107, UTMN 4147245.

East Fork Black River Station #2 (NW ¼ sec. 9, T. 32 N., R. 2 E.) was located in the vicinity of Wicks Cave, north of Lesterville, Missouri. Geographic coordinates collected near the midpoint of the sampling reach are UTME 691135, UTMN 4149194.

East Fork Black River Station #3 (SW ¼ sec. 33, T. 33 N., R. 2 E.) was located downstream of the Lower Taum Sauk Reservoir spillway. Geographic coordinates of the upstream terminus of the sampling reach are UTME 691167, UTMN 4151896.

East Fork Black River Station #4 (SW ¼ sec. 21, T. 33 N., R. 2 E.) was located upstream of the AmerenUE "bin wall," a water-permeable metal wall that acts as a sieve to prevent bedload material from entering the Lower Reservoir. Geographic coordinates of the downstream terminus of the sampling reach are UTME 691085, UTMN 4155444.

East Fork Black River Station #5 (SW ¼ sec. 16, T. 33 N., R. 2 E.) was located immediately upstream of the shut-ins at Johnson's Shut-Ins State Park. Geographic

coordinates of the downstream terminus of the sampling reach are UTME 690836, UTMN 4156925.

East Fork Black River Station #6 (NW ¼ sec. 16, T. 33 N., R. 2 E.) was located downstream of the debris dam caused by the Upper Taum Sauk Reservoir failure. This station is located in the "West Channel." Geographic coordinates of the upstream terminus of the sampling reach are UTME 690586, UTMN 4157636.

East Fork Black River Station #7 (NW ¼ sec. 16, T. 33 N., R. 2 E.) also was located downstream of the debris dam mentioned above. This station is located in a stream reach referred to as the "East Channel" which, at the time of spring 2007 sampling, was the main conveyance of East Fork Black River flow between the debris dam and the downstream point at which the East Channel and the West Channel converge. Geographic coordinates of the upstream terminus of the sampling reach are UTME 690586, UTMN 4158170.

East Fork Black River Station #8 (S ½ sec. 4, T. 33 N., R. 2 E.) was located upstream from the Imboden Fork confluence. This reach was outside the area of influence resulting from the Upper Taum Sauk Reservoir failure and was considered a control reach. Geographic coordinates of the upstream terminus of the sampling reach are UTME 690756, UTMN 4159120.

Black River Station #1 (N ½ sec. 31, T. 31 N., R. 2 E.) was located upstream from the State Highway K bridge. Geographic coordinates at the upstream terminus of the sampling reach are UTME 697979, UTMN 4133508.

Black River Station #2 (E ½ sec.28, T. 32 N., R. 2 E.) was located at the Missouri Department of Conservation's Lesterville Access. Geographic coordinates near the midpoint of the reach are UTME 692404, UTMN 4143345.

Black River Station #3 (N ½ sec. 21, T. 32 N., R. 2 E.) was accessed via the Twin Rivers Landing Resort, with samples collected immediately upstream of the East Fork Black River confluence. Geographic coordinates at the downstream terminus of the sample reach are UTME 691602, UTMN 4145994.

Taum Sauk Creek #1 (NW ¼ SE ¼ sec. 27, T. 33 N., R. 2 E.) was sampled downstream of the confluence with Little Taum Sauk Creek, near the County Road 204 crossing. Geographic coordinates at the upstream terminus of the sample reach are UTME 693419, UTMN 4153536.

Imboden Fork #1 (SW ¼ sec. 5, T. 33 N., R. 2 E.) was sampled within line-of-sight of State Highway MM, near the point where the pavement ends. Geographic coordinates at the midpoint of the sample reach are UTME 689710, UTMN 4161164.

4.0 Methods

4.1 Macroinvertebrate Collection and Analyses

A standardized sample collection procedure was followed as described in the Semi-quantitative Macroinvertebrate Stream Bioassessment Project Procedure (**SMSBPP**) (MDNR 2003a). A total of three standard habitats—flowing water over coarse substrate (riffles and runs), depositional substrate in non-flowing water (pools), and rootmat at the stream edge—were sampled at all East Fork Black River, Taum Sauk Creek, and Imboden Fork locations. Because the Black River is larger than what is normally considered "wadeable," non-flow and rootmat habitats could not be sampled consistently or safely. The biological assessment for the Black River is based solely on the macroinvertebrate community present in riffle habitat.

A standardized sample analysis procedure was followed as described in the SMSBPP. The following four metrics were used: 1) Taxa Richness (**TR**); 2) total number of taxa in the orders Ephemeroptera, Plecoptera, and Trichoptera (**EPTT**); 3) Biotic Index (**BI**); and 4) Shannon Diversity Index (**SDI**). These metrics were scored and combined to form the Macroinvertebrate Stream Condition Index (**MSCI**). Macroinvertebrate Stream Condition Indices between 20-16 qualify as fully biologically supporting, between 14-10 are partially supporting, and 8-4 are considered non-supporting of aquatic life. The multi-habitat macroinvertebrate data are presented in Appendix B as laboratory bench sheets.

Although the MSCI score is normally based on multi-habitat data, we have the ability to calculate criteria on an individual habitat basis. Our goals for calculating single-habitat criteria were twofold: 1) to determine whether a differential effect existed among the multiple habitats sampled in this study and 2) to conduct a macroinvertebrate investigation based on the single habitat samples from Black River. Investigating single-habitat criteria allowed us the ability to make more precise judgments on the effects to the overall community.

Additionally, macroinvertebrate data were analyzed in the following specific ways. First, comparisons were made among reaches longitudinally. This comparison addresses influences that may result from differential sediment deposition and possible scouring effects among sites within the study reach. Stations located in the river reach downstream of the Lower Taum Sauk Reservoir were grouped for comparison as were stations located upstream of the Lower Reservoir. Macroinvertebrate community attributes that existed prior to the Upper Reservoir failure were compared with conditions as they exist afterward. Data are summarized and presented in tabular format comparing means of the four standard metrics and other parameters at each of the stations sampled in this project.

4.2 Macroinvertebrate Laboratory Processing

Laboratory processing was consistent with the description in the Semi-quantitative Macroinvertebrate Stream Bioassessment Project Procedure (MDNR 2003a). Each sample was processed under 10x magnification to remove a habitat-specific target number of individuals from debris. Individuals were identified to standard taxonomic levels (MDNR 2005d) and enumerated.

4.3 Physicochemical Data Collection and Analysis

During each survey period, *in situ* water quality measurements were collected at all stations. Field measurements included temperature (MDNR 1993), dissolved oxygen (MDNR 2002), conductivity (MDNR 2000), turbidity (MDNR 2005c), and pH (MDNR 2001b). Additionally, water samples were collected by the WQMS and analyzed by ESP's Chemical Analysis Section for chloride, total phosphorus, ammonia-N, nitrite+nitrate-N, and total nitrogen (all parameters reported in mg/L). Procedures outlined in Field Sheet and Chain of Custody Record (MDNR 2001a) and Required/Recommended Containers, Volumes, Preservatives, Holding Times, and Special Sampling Considerations (MDNR 2008) were followed when collecting water quality samples.

Stream velocity was measured at each station where practicable during the study using a Marsh-McBirney Flo-Mate™ Model 2000 flow meter. Discharge was calculated per the methods in the Standard Operating Procedure MDNR-FSS-113, Flow Measurement in Open Channels (MDNR 2001c), with the following exceptions: 1) Black River Station 1 discharge data were obtained using the USGS gaging station at State Road K (Station #07061500); 2) discharge was assumed to be nearly equal at Black River Station 1 and 2 due to the absence of significant tributaries between the two stations; and 3) Black River Station 3 discharge was estimated by subtracting the flow data obtained from the USGS gaging station at Highway 21 (Station #07061300) at East Fork Black River Station 1 from the aforementioned gaging station data.

Physicochemical data were summarized and presented in tabular form for comparison among stations (Table 2, Table3, Table 4 and Table 5).

4.4 Quality Assurance/Quality Control (QA/QC)

4.4.1 Field Meters

All field meters used to collect water quality parameters were maintained in accordance with the Standard Operating Procedure MDNR-ESP-213, Quality Control Procedures for Checking Water Quality Field Instruments (MDNR 2005b).

4.4.2 Biological Samples

Approximately 3% of macroinvertebrate samples were checked for accuracy of organism removal from sample debris. These tasks were performed consistent with those methods found in the Semi-quantitative Macroinvertebrate Stream Bioassessment Project Procedure (MDNR 2003a).

4.4.3 Biological Data Entry

All macroinvertebrate data were entered into the WQMS macroinvertebrate database consistent with the Standard Operating Procedure MDNR-WQMS-214, Quality Control Procedures for Data Processing (MDNR 2003b).

5.0 Data Results

5.1 Physicochemical Data

Flow and non-nutrient water quality parameters of East Fork Black River sites sampled in spring 2007 are presented in Table 2, with fall 2007 data in Table 3. Discharge from the Lower Reservoir exceeded that of the upstream East Fork Black River reach flowing through Johnson's Shut-Ins at the time of our sampling during both field seasons. Turbidity readings were consistently higher among the lower East Fork stations, indicating that the Lower Reservoir continues to be a source of turbidity for the downstream EFBR reach. In turn, turbid water from the Lower Reservoir moves benthic sediment through the lower East Fork, which has a slight effect on the Black River. Whereas Black River Station 3 turbidity, upstream of the EFBR confluence, was less than 1 NTU, Station 2 was slightly higher at 1.44 NTU in spring 2007. Turbidity had decreased to 1.06 NTU at Black River Station 1, farthest downstream among our sample stations. Although turbidity tended to be higher among the lower East Fork stations, the highest turbidity reading was observed in spring 2007 at Station 5, which was located just upstream of the shut-ins at JSISP. Turbidity at this point was attributable to channel restoration construction activities occurring upstream. Conductivity was slightly higher among the Black River stations than the East Fork and tributary stations, with the remaining non-nutrient water quality parameters being similar among stations.

Nutrient concentrations and chloride concentrations are presented in Table 4 (spring 2007) and Table 5 (fall 2007). Ammonia as nitrogen and total phosphorus were either below the detectable limit or below the analytical Practical Quantitation Limit (**PQL**) for all sample stations for both 2007 seasons. Only total nitrogen was consistently present in detectable levels, with highest levels occurring in Black River samples. Chloride concentrations also were higher among Black River samples, but only two of the six exhibited concentrations higher than the PQL. Among East Fork samples, chloride tended to be lower downstream of the Lower Reservoir. This difference was more pronounced in fall samples. Nitrite+nitrate (NO_2+NO_3-N) concentrations were higher in

Black River samples than the East Fork or tributary stations. During fall 2007 NO_2+NO_3-N concentrations were present in levels above the PQL at all stations except Taum Sauk Creek. In spring 2007 samples, NO_2+NO_3-N concentrations generally were lower, with only Black River, East Fork Black River Station 5, and Imboden Fork

Table 2
Spring 2007 Flow and *In situ* Water Quality Measurements

	Parameter					
Station	Flow (cfs)	Temperature (˚C)	Dissolved O_2 (mg/L)	Conductivity (µS/cm)	pH	Turbidity (NTU)
BR #1	284	10.7	11.3	249	7.92	1.06
BR #2	284*	10.4	11.8	258	8.06	1.44
BR #3	240*	10.7	12.1	284	8.17	<1.00
EFBR #1	44.0	11.0	10.4	143	7.42	6.71
EFBR #2	42.9	10.8	10.9	141	7.69	7.90
EFBR #3	53.0	11.9	11.2	136	7.98	8.97
EFBR #4	28.3	11.1	10.7	145	7.90	5.20
EFBR #5	25.8	11.3	11.1	145	7.79	14.5
EFBR #6**	N/A	N/A	N/A	N/A	N/A	N/A
EFBR #7	22.6	11.2	11.8	134	7.97	<1.00
EFBR #8	13.4	11.0	11.3	132	7.93	<1.00
IF #1	7.6	9.7	10.9	129	7.57	<1.00
TSC #1	6.4	8.9	11.8	91.9	7.49	1.03

*Estimated value; **Station under construction and dewatered

Table 3
Fall 2007 Flow and *In situ* Water Quality Measurements

	Parameter					
Station	Flow (cfs)	Temperature (˚C)	Dissolved O_2 (mg/L)	Conductivity (µS/cm)	pH	Turbidity (NTU)
BR #1	217	19.3	9.18	285	7.72	<1.00
BR #2	217*	20.6	9.70	290	7.98	<1.00
BR #3	127*	22.1	9.45	340	8.17	<1.00
EFBR #1	90.0	22.9	9.06	136	7.77	5.42
EFBR #2	54.1	24.1	8.76	134	7.91	6.01
EFBR #3	50.3	21.7	8.04	130	7.56	10.2
EFBR #4	17.9	22.6	9.56	199	8.11	<1.00
EFBR #5	15.2	25.6	8.66	202	7.88	<1.00
EFBR #6	23.0	25.4	9.24	187	7.99	<1.00
EFBR #7**	N/A	N/A	N/A	N/A	N/A	N/A
EFBR #8	5.3	20.0	7.27	183	7.58	<1.00
IF #1	3.1	19.6	6.13	180	7.42	<1.00
TSC #1	3.5	20.7	8.17	140	7.22	<1.00

*Estimated value; **Channel restoration project isolating Station 7 from flowing water began in April 2007

samples having NO_2+NO_3-N levels above the PQL. As with the fall data, NO_2+NO_3-N at Taum Sauk Creek were lowest in spring, in nondetectable concentrations.

Table 4
Spring 2007 Black River and East Fork Black River Watershed Nutrient Concentrations

	Parameter (mg/L)				
Station	NH_3-N	NO_2+NO_3-N	Total Nitrogen	Total Phosphorus	Chloride
BR #1	*	0.17	0.18	*	3.29**
BR #2	*	0.18	0.20	0.03**	3.81**
BR #3	*	0.20	0.22	0.02**	4.31**
EFBR #1	*	0.04**	0.08	0.02**	1.88**
EFBR #2	*	0.04**	0.09	0.02**	1.85**
EFBR #3	*	0.03**	0.08	0.04**	1.92**
EFBR #4	*	0.04**	0.07	0.02**	2.02**
EFBR #5	*	0.05	0.08	0.02**	2.21**
EFBR #6***	N/A	N/A	N/A	N/A	N/A
EFBR #7	*	0.03**	0.06	0.02**	1.94**
EFBR #8	*	0.02**	0.05	0.01**	2.16**
IF #1	*	0.08	0.10	0.02**	1.55**
TSC #1	*	*	0.02**	0.04**	0.78**

*Below detectable limits; **Estimated value, detected below Practical Quantitation Limits; ***Station under construction and dewatered

Table 5
Fall 2007 Black River and East Fork Black River Watershed Nutrient Concentrations

	Parameter (mg/L)				
Station	NH_3-N	NO_2+NO_3-N	Total Nitrogen	Total Phosphorus	Chloride
BR #1	*	0.26	0.32	*	4.02**
BR #2	*	0.28	0.35	*	6.17
BR #3	0.05	0.31	0.38	*	5.94
EFBR #1	*	0.09	0.22	*	1.33**
EFBR #2	*	0.08	0.22	*	1.38**
EFBR #3	*	0.07	0.29	*	1.34**
EFBR #4	*	0.13	0.19	*	2.39**
EFBR #5	*	0.14	0.20	*	2.49**
EFBR #6	*	0.11	0.17	*	2.48**
EFBR #7***	N/A	N/A	N/A	N/A	N/A
EFBR #8	*	0.15	0.20	*	3.04**
IF #1	*	0.25	0.31	*	1.84**
TSC #1	*	0.04**	0.08	*	1.00**

*Below detectable limits; **Estimated value, detected below Practical Quantitation Limits; *** Channel restoration project isolated Station 7 from flowing water in April 2007

5.2 Biological Assessment

5.2.1 East Fork Black River Longitudinal Assessment

Metrics and scores calculated for the East Fork Black River were compared to biological criteria based on reference sites from the Ozark/Black/Current EDU. Prior to the reservoir failure, East Fork Black River was one of seven reference streams within this EDU. Criteria for spring and fall sample seasons—presented in Tables 6 and 7—were used to assess the overall health of the aquatic communities within the EDU.

Table 6
Biological Criteria for Warm Water Reference Streams in the Ozark/Black/Current EDU, Spring Season

	Score = 5	Score = 3	Score = 1
TR	>91	91-45	<45
EPTT	>31	31-15	<15
BI	<5.4	5.4-7.7	>7.7
SDI	>3.29	3.29-1.65	<1.65

Table 7
Biological Criteria for Warm Water Reference Streams in the Ozark/Black/Current EDU, Fall Season

	Score = 5	Score = 3	Score = 1
TR	>83	83-41	<41
EPTT	>25	25-12	<12
BI	<5.1	5.1-7.5	>7.5
SDI	>3.27	3.27-1.63	<1.63

5.2.1.1 East Fork Black River Downstream of Lower Taum Sauk Reservoir

Downstream of the Lower Reservoir during the spring 2007 sample season, macroinvertebrate biological metrics tended to decline as stations neared the dam (Table 8). Values for Taxa Richness, EPT Taxa, and Shannon Diversity Index were highest at Station 1 and declined in the remaining upstream stations; Biotic Index values among the downstream East Fork stations tended to increase from Station 1 to Station 3, but the difference was insufficient to change the score for this metric. Station 3 exhibited the lowest Taxa Richness and EPT Taxa values not only among stations downstream of the Lower Reservoir, but among all stations sampled for multiple habitats. Macroinvertebrate Stream Condition Index scores were highest at Station 1 and lowest at Station 3. Only Station 3 had MSCI scores sufficiently low to rank partially biologically supporting.

Table 8
Metric Values and Scores for Lower East Fork Black River Stations, Spring 2007 Season, Using Ozark/Black/Current Biological Criteria Reference Data

Site	TR	EPTT	BI	SDI	MSCI	Support
#1 Value	113	40	5.7	3.65		
#1 Score	5	5	3	5	18	**Full**
#2 Value	106	31	6.0	3.50		
#2 Score	5	3	3	5	16	**Full**
#3 Value	73	16	6.2	2.81		
#3 Score	3	3	3	3	12	**Partial**

Compared to the spring data, biological metrics and scores were distributed more similarly in fall 2007 (Table 9). Taxa Richness values were nearly equal among the three downstream stations, unlike the spring data in which Station 3 had far lower Taxa Richness and fewer EPT Taxa. The difference in the MSCI score at Station 3 was the result of a lower EPT Taxa value; a single additional EPT taxon would have resulted in an MSCI score equal to the remaining two stations.

Table 9
Metric Values and Scores for Lower East Fork Black River Stations, Fall 2007 Season, Using Ozark/Black/Current Biological Criteria Reference Data

Site	TR	EPTT	BI	SDI	MSCI	Support
#1 Value	90	28	6.1	3.53		
#1 Score	5	5	3	5	18	**Full**
#2 Value	93	35	5.93	3.38		
#2 Score	5	5	3	5	18	**Full**
#3 Value	91	25	6.0	3.39		
#3 Score	5	3	3	5	16	**Full**

To assess potential habitat and benthic sediment distribution changes that may occur over time in the lower East Fork, habitat-specific biological criteria comparisons of pre- versus post-event metric scores are discussed (Table 10). When comparing single habitat scores from previous years, it appears that rootmat at Station 3 continues to be the weakest contributing habitat; however, coarse substrate and nonflow habitats were sufficiently high in fall 2007 to overcome the relatively low score of the rootmat component. MSCI scores for Station 3 in fall 2007 were a combination of two high-scoring habitats and one low scoring habitat, whereas 2005 and 2006 fall scores resulted from a single high-scoring and two low scoring habitats. Station 3 was the only site in which each of the three habitats scored higher in fall 2007 compared to spring 2007. Nonflow habitat scores were lowest at Stations 2 and 3 during spring 2007; these scores were lower even than spring 2006, the first sampling event following the Upper Reservoir breach.

Table 10
Lower East Fork Black River
Single Habitat Stream Condition Index Scores

	Coarse Substrate					Non-Flow					Rootmat				
↓ Station / Sample Year →	F05	S06	F06	S07	F07	F05	S06	F06	S07	F07	F05	S06	F06	S07	F07
EF Black R. #1	20	12	18	16	18	16	12	20	18	16	14	14	16	18	12
EF Black R. #2	18	16	18	16	18	18	18	20	10	18	12	14	12	16	12
EF Black R. #3	14	12	18	12	18	18	18	12	10	18	12	14	12	10	12

5.2.1.2 East Fork Black River Upstream of Lower Taum Sauk Reservoir

Only two of the four stations upstream of the Lower Taum Sauk Reservoir attained fully supporting status in spring 2007 (Table 11). Station 8, the upstream control station, and Station 4, upstream of the bin wall, received fully supporting scores. The two stations located within JSISP upstream of the shut-ins (Stations 5 & 7) scored partially supporting. The two stations with partially supporting scores each had lower Taxa Richness values and slightly lower Shannon Diversity Index values compared to those with fully supporting scores. Only Station 4, the bin wall site, had Taxa Richness and EPT Taxa values sufficient to achieve the highest score for those categories. Although Station 7 had 30 additional taxa in spring 2007 than 2006 (84 in 2007 compared to 54 in 2006), a slightly lower Shannon Diversity Index in 2007 resulted in this station having a partially supporting score. The same phenomenon occurred at Station 5, just upstream of the shut-ins within the park. Station 5 had 22 more taxa in spring 2007 than 2006, but a slightly lower Shannon Diversity Index.

Table 11
Metric Values and Scores for Upper East Fork Black River Stations, Spring 2007 Season, Using Ozark/Black/Current Biological Criteria Reference Data

Site	TR	EPTT	BI	SDI	MSCI	Support
#4 Value	104	33	5.4	3.71		
#4 Score	5	5	3	5	18	**Full**
#5 Value	75	25	4.6	2.93		
#5 Score	3	3	5	3	14	**Partial**
#6 Value	sample station under construction					
#6 Score						**N/A**
#7 Value	84	28	4.9	3.25		
#7 Score	3	3	5	3	14	**Partial**
#8 Value	90	28	4.4	3.46		
#8 Score	3	3	5	5	16	**Full**

As was the case with the spring season, the two stations located within JSISP upstream of the shut-ins scored partially supporting, with the upstream control station and the station upstream of the bin wall having fully supporting scores (Table 12). For the stations that scored only partially supporting, Taxa Richness, EPT Taxa, and Shannon Diversity Index all were lower than the remaining stations.

Table 12
Metric Values and Scores for Upper East Fork Black River Stations, Fall 2007 Season, Using Ozark/Black/Current Biological Criteria Reference Data

Site	TR	EPTT	BI	SDI	MSCI	Support
#4 Value	90	28	5.9	3.36		
#4 Score	5	5	3	5	18	**Full**
#5 Value	69	22	6.2	3.15		
#5 Score	3	3	3	3	12	**Partial**
#6 Value	64	22	5.6	3.06		
#6 Score	3	3	3	3	12	**Partial**
#7 Value	sample station discontinued					
#7 Score						**N/A**
#8 Value	86	27	5.6	3.62		
#8 Score	5	5	3	5	18	**Full**

5.2.2 East Fork Black River Tributaries Biological Assessment

In addition to East Fork Black River Station 8, Taum Sauk Creek and Imboden Fork were added as control sites beginning in spring 2006. Taum Sauk Creek achieved fully supporting status in both 2007 sample seasons, but Imboden Fork was fully supporting only in spring (Tables 13 and 14). During spring 2007, each of the tributary streams achieved the highest possible MSCI score with Imboden Fork Taxa Richness surpassing that of Taum Sauk Creek and the remaining metrics being comparable. During the fall season Imboden Fork had much lower Taxa Richness, EPT Taxa, and Shannon Diversity Index values compared to Taum Sauk Creek. The number of EPT Taxa at Imboden Fork in fall 2007 was less than half that of Taum Sauk Creek; Taxa Richness and Shannon Diversity Index were also much lower at Imboden Fork.

Table 13
East Fork Black River Tributaries Metric Values and Scores, Spring 2007 Season, Using Ozark/Black/Current Biological Criteria Reference Data

Site	TR	EPTT	BI	SDI	MSCI	Support
Taum Sauk Ck. Value	92	33	5.0	3.41		
Taum Sauk Ck. Score	5	5	5	5	20	**Full**
Imboden Fork Value	105	32	4.7	3.55		
Imboden Fork Score	5	5	5	5	20	**Full**

Table 14
East Fork Black River Tributaries Metric Values and Scores, Fall 2007 Season, Using Ozark/Black/Current Biological Criteria Reference Data

Site	TR	EPTT	BI	SDI	MSCI	Support
Taum Sauk Ck. Value	95	33	5.8	3.50		
Taum Sauk Ck. Score	5	5	3	5	18	**Full**
Imboden Fork Value	64	16	6.1	2.76		
Imboden Fork Score	3	3	3	3	12	**Partial**

5.2.3 Black River Biological Assessment

Coarse substrate habitat was sampled at three sites on the Black River—two downstream of the East Fork Black River confluence and one upstream—to determine 1) whether the macroinvertebrate community was affected by the input of East Fork sediment and 2) if an effect is observed, determine the extent. Although the Black River was too large for each of the three habitats to be sampled via wading, we were able to sample coarse substrate during normal flow conditions and a single habitat MSCI was calculated.

Each of the Black River stations achieved fully supporting status during both sample seasons (Tables 15 and 16), with the upstream and downstream stations achieving the highest possible single habitat MSCI score in spring 2007. Black River Station 2 exhibited slightly lower Taxa Richness and Shannon Diversity Index values in spring, but the remaining metrics were sufficient to yield a fully supporting score for this site.

Table 15
Black River Coarse Substrate Habitat Metric Values and Scores, Spring 2007 Season, Using Ozark/Black/Current Biological Criteria Reference Data

Site	TR	EPTT	BI	SDI	MSCI	Support
#1 Value	49	22	3.9	2.85		
#1 Score	3	5	5	5	18	**Full**
#2 Value	41	22	3.3	2.40		
#2 Score	3	5	5	3	16	**Full**
#3 Value	46	22	3.5	2.72		
#3 Score	3	5	5	3	16	**Full**

Biological metric values generally were comparable among fall 2007 Black River stations. Each of the Black River stations achieved a fully supporting ranking in fall 2007, with the upstream control site attaining the highest possible score (Table 16). The two stations downstream of the East Fork confluence had slightly higher Biotic Index values, which resulted in lower scores for this single metric. The remaining metrics at this station, however, achieved the highest scores possible.

Table 16
Black River Coarse Substrate Habitat Metric Values and Scores, Fall 2007 Season, Using Ozark/Black/Current Biological Criteria Reference Data

Site	TR	EPTT	BI	SDI	MSCI	Support
#1 Value	46	23	4.3	2.81		
#1 Score	5	5	3	5	18	**Full**
#2 Value	46	21	4.4	2.71		
#2 Score	5	5	3	5	18	**Full**
#3 Value	43	20	4.0	2.53		
#3 Score	5	5	5	5	20	**Full**

5.3 Macroinvertebrate Community Composition

5.3.1 East Fork Black River

Macroinvertebrate Taxa Richness, EPT Taxa, and percent EPT are presented in Tables 17 and 18. These tables also provide percent composition data for the five dominant macroinvertebrate families at each East Fork Black River Station. The percent relative abundance data were averaged from the sum of three macroinvertebrate habitats—coarse substrate, nonflow, and rootmat—sampled at each station.

Spring 2007 macroinvertebrate samples from East Fork Black River averaged 92 total taxa (range 73-113) and 29 EPT Taxa (range 16-40) (Table 17). Midge larvae (Chironomidae) were the dominant taxa group at all stations. Riffle beetles (Elmidae) and squaregill mayflies (Caenidae) were either second or third in abundance at each of the four stations downstream of JSISP, with the exception of Station 3, where caenid mayflies ranked fifth in abundance. At the two stations within JSISP—Stations 5 and 7—as well as the upstream control station, black fly larvae (Simuliidae) were second in abundance to chironomids. Unlike the stations downstream of JSISP, caenid mayflies ranked among the five most abundant taxa only at Station 7. Whereas caenid mayflies were rare in upstream samples relative to stations downstream of JSISP, mayflies in the family Baetidae were among the dominant taxa at Stations 5, 7, and 8. The number of mayfly taxa was highest at Station 1 (N=18), whereas Station 3 had the lowest (N=9). The remaining stations had comparable numbers of mayfly taxa, ranging between 13 and 15, with the exception of Station 5, which had 11. Each of the three mayfly families—Heptageniidae, Ephemerellidae, and Baetidae—included genera or species that were present in both Station 1 and Station 2 samples, but were not found in Station 3 samples. In most cases, these taxa were rare among all stations (for example, five or fewer *Acentrella* were found in all but one sample) but were absent in Station 3. In several cases, however, mayfly taxa that were abundant at Stations 1 and 2 [e.g. *Caenis latipennis, Isonychia bicolor,* and *Maccaffertium* (formerly *Stenonema*) *mediopunctatum*] were present in much lower numbers in Station 3. The number of stonefly taxa was distributed similarly to mayflies—the highest number of taxa being at Station 1 (N=9),

the lowest at Station 3 (N=4), with the remainder distributed between the two but skewed toward the upper portion of the range (6-8). Although Station 3 had the lowest number of stonefly taxa, stoneflies made up a similar percentage of samples among all stations except Stations 2 and 8. The highest percentage of stoneflies occurred at Station 8 (7.8 percent), whereas the smallest percentage of the overall sample occurred at Station 2 (1.9 percent). With the exception of Station 2, East Fork samples had one or two stonefly taxa that were dominant. No single taxon was notably higher at Station 2 and each was present in fairly low (< 10 individuals) numbers. For stations in which there were dominant stonefly taxa, no single taxon was universally dominant among stations. Only *Amphinemura* was dominant at more than one station. More variability existed in caddisfly taxa richness among East Fork stations than either mayfly or stonefly. The number of caddisfly taxa was highest at Station 1 (N=12) and lowest at Station 3 (N=3). In addition to having the fewest caddisfly taxa, caddisflies made up the lowest percentage at Station 3 with only nine individuals present in the sample. Caddisflies were relatively rare at Stations 2 and 3, with no single taxon representing a dominant percentage of the sample. For each of the remaining stations, however, one caddisfly taxon tended to account for a far greater portion of the sample than the others. As was the case with stoneflies, no single taxon was consistently dominant.

Table 17
Spring 2007 East Fork Black River Macroinvertebrate Composition

↓Variable Station→	1	2	3	4	5	6	7	8
Taxa Richness	113	106	73	104	75		84	90
Number EPT Taxa	40	31	16	33	25		28	28
% Ephemeroptera	15.8	20.1	4.2	18.6	13.3		16.9	14.4
% Plecoptera	3.5	1.9	4.1	4.0	4.7		4.8	7.8
% Trichoptera	4.2	2.3	0.7	8.6	6.6		3.6	4.3
MSCI Score	18	16	12	18	14		14	16
% Dominant Families								
Chironomidae	46.7	43.6	49.2	47.0	35.7		41.9	33.6
Elmidae	10.5	7.5	31.4	7.6	2.4		--	6.5
Caenidae	7.1	8.8	1.9	8.0	--		4.5	--
Simuliidae	4.8	5.3	--	--	26.9		23.5	25.4
Heptageniidae	4.0	--	--	--	--		--	--
Tubificidae	--	7.3	3.6	--	--		--	--
Perlidae	--	--	3.7	--	--		--	--
Hydroptilidae	--	--	--	4.6	5.2		2.8	--
Baetidae	--	--	--	4.5	9.4		6.5	6.1
Empididae	--	--	--	--	2.4		--	--
Leuctridae	--	--	--	--	--		--	4.3

Fall 2007 macroinvertebrate samples averaged 83 total taxa (range 64-93) and 27 EPT Taxa (Table 18). Caenid mayflies were the dominant taxa at all sites except Station 3 and

Station 8, where chironomids were approximately equal in abundance. Caenid mayflies, riffle beetles (Elmidae), heptageniid mayflies, and chironomids were among the dominant taxa at nearly all stations. Riffle beetles were of lower abundance at Station 5 and Station 6 in fall 2007 samples. Despite having lower numbers of individuals, both stations had more elmid taxa than Station 3, which had only two. A single riffle beetle genus, *Stenelmis*, made up at least half of all elmid taxa among sample sites except Stations 5 and 6. Heptageniid mayflies were among the dominant taxa at all but Station 3, where

Table 18
Fall 2007 East Fork Black River Macroinvertebrate Composition

↓Variable Station→	1	2	3	4	5	6	7	8
Taxa Richness	90	93	91	90	69	64		86
Number EPT Taxa	28	35	25	28	22	22		27
% Ephemeroptera	40.3	51.6	28.1	49.1	54.8	66.4		45.2
% Plecoptera	0.9	1.9	0.8	1.3	0.4	0.2		1.3
% Trichoptera	4.2	5.9	7.7	6.6	4.0	7.2		10.3
MSCI Score	18	18	16	18	12	12		18
% Dominant Families								
Caenidae	20.1	28.3	17.9	27.7	33.7	30.8		15.5
Elmidae	15.5	12.9	15.3	7.6	--	--		7.6
Heptageniidae	11.3	13.3	--	9.2	11.7	18.5		13.5
Chironomidae	7.0	9.1	18.3	19.1	16.1	15.0		15.8
Tubificidae	6.6	--	4.9	--	--	--		--
Coenagrionidae	--	4.4	--	--	--	--		--
Hydropsychidae	--	--	5.8	--	--	--		9.0
Isonychiidae	--	--	--	6.4	--	7.8		--
Baetidae	--	--	--	--	4.4	8.3		--
Psephenidae	--	--	--	--	5.3	--		--

there were fewer than half the individuals found at the next nearest sample. Station 3 also had the lowest overall percentage of mayflies making up the sample of any of the East Fork Black River stations. The number of mayfly taxa was much less variable among stations in fall samples. The highest number of mayfly taxa occurred at Station 2 (N=20), whereas Stations 3 and 5 had the lowest (N=16). The remaining stations had either 17 or 18 taxa, with no pattern relative to their location in the watershed. Compared to spring samples, stoneflies were rare in the fall, with the highest percentage being only 1.9 percent at Station 2. Stoneflies contributed the lowest percentage at Station 5 (0.4 percent) and Station 6 (0.2 percent). The number of stonefly taxa was greatly reduced among all East Fork fall samples except Station 3, where there were already few stoneflies. Three stations—Stations 1, 5, and 6—had only a single stonefly taxon present in samples. The genus *Neoperla* was the most abundant stonefly among the downstream stations, including and downstream of Station 4. For Station 6 the only stonefly present was *Zealeuctra*; this genus also was the most abundant of three stonefly taxa at Station 8.

Compared to spring samples, caddisflies made up a larger percentage of fall samples at stations downstream of the Lower Reservoir, with the exception of Station 1 where they were equal among seasons. For the remaining upstream stations, there were no seasonal trends. The number of caddisfly taxa was highest at Station 2 (N=10) and lowest at Station 6 (N=4). For fall samples, the number of caddisfly taxa did not directly relate to their abundance. Station 6 had the lowest number of caddisfly taxa, yet they accounted for a higher percentage of the sample than most stations. Station 1 had nine caddisfly taxa, but each were present in sufficiently low numbers that they accounted for only 4.2 percent of the sample; only Station 5 was lower with caddisflies making up 4.0 percent. Two caddisfly genera, *Chimarra* and *Cheumatopsyche*, were consistently the two most abundant caddisfly taxa among all stations. For Stations 1 and 2, the dominant caddisfly genus was *Chimarra*, with *Cheumatopsyche* occurring only in low numbers. *Cheumatopsyche* was the dominant caddisfly genus among the remaining East Fork Black River stations. This genus was particularly abundant at Station 8, where it made up nearly 87 percent of caddisflies present in the sample.

5.3.2 East Fork Black River Tributaries

Imboden Fork Taxa Richness was among the highest in spring 2007 samples (Table 19). Only East Fork Black River Stations 1 and 2 were higher with Taxa Richness values of 113 and 106, respectively. Taum Sauk Creek Taxa Richness was lower than that of Imboden Fork, but was comparable to or higher than most of East Fork stations and was sufficiently high to achieve the highest possible score for that metric. Chironomids were the dominant taxa group at both tributary stations during spring, with two stonefly families (Perlodidae and Nemouridae) combining to make up roughly 19 percent of samples from both stations. Mayflies in the family Baetidae (mostly *Acentrella*) were second in abundance at Imboden Fork, but no mayflies were among the five dominant taxa at Taum Sauk Creek. Stoneflies were considerably more abundant in the tributary stations than among the East Fork stations and were mostly represented by two genera, *Amphinemura* and *Isoperla*, with a smaller but appreciable number of individuals in the family Leuctridae that were too small to identify to genus level. Caddisflies were present in the tributaries with comparable abundance and diversity as East Fork stations.

Although biological metrics were mostly unchanged between seasons at Taum Sauk Creek, notable differences in the macroinvertebrate community composition were observed. The relative contributions of mayflies and stoneflies were essentially reversed when comparing spring and fall samples. Whereas nine stonefly taxa accounted for nearly a quarter of the sample in spring, four taxa made up only 3.5 percent of the fall sample. Mayflies exhibited an opposite seasonal trend. In spring 14 mayfly taxa made up 6.2 percent of the sample, but in fall 21 taxa accounted for slightly more than 50 percent. Caddisflies were twice as abundant in fall samples compared to spring samples at Taum Sauk Creek, despite there being two fewer caddisfly taxa present in the fall sample. Three caddisfly genera—*Helicopsyche*, *Polycentropus*, and *Triaenodes*—were most numerous in the fall sample, accounting for 83 percent of all caddisflies present. By

comparison, although more caddisfly taxa were present in the spring sample, only one genus, *Hydroptila*, was present in noticeably higher numbers (making up 47 percent of caddisflies in the sample) than the remaining caddisfly taxa.

Table 19
East Fork Black River Tributaries Macroinvertebrate Composition

↓Variable Station→	Taum Sauk Creek		Imboden Fork	
	Spring 2007	Fall 2007	Spring 2007	Fall 2007
Taxa Richness	92	95	105	64
Number EPT Taxa	33	33	32	16
% Ephemeroptera	6.2	50.9	19.9	22.2
% Plecoptera	23.6	3.5	22.3	0.8
% Trichoptera	3.0	6.2	2.3	2.0
MSCI Score	18	18	20	12
% Dominant Families				
Chironomidae	43.5	9.1	33.5	6.1
Perlodidae	11.8	--	10.2	--
Nemouridae	7.3	--	8.6	--
Simuliidae	6.4	--	--	--
Tubificidae	6.1	--	--	--
Baetidae	--	--	13.9	--
Asellidae	--	--	7.9	37.8
Caenidae	--	28.3	--	--
Heptageniidae	--	14.9	--	10.1
Psephenidae	--	6.2	--	14.3
Leptophlebiidae	--	3.9	--	5.2

Despite having some of the best biological metric values and scores among all stations in spring 2007 samples, Imboden Fork metrics exhibited a dramatic decline in the fall (Table 19). Taxa Richness fell from 105 to 64 and EPT Taxa were reduced by half, falling from 32 to 16. Aquatic sowbugs (Isopoda) of the family Asellidae, which included *Lirceus* as well as blind and unpigmented *Caecidotea*, were dominant in fall Imboden Fork samples. When including all non-crayfish crustaceans, Amphipoda and Isopoda accounted for 43 percent of the fall sample. Each of the taxa groups that make up the EPT Taxa metric—mayflies, stoneflies, and caddisflies—was reduced considerably. Imboden Fork was only one of two stations that experienced a decline of mayfly taxa from spring to fall 2007. Compared to East Fork Black River Station 1, which had a mayfly reduction by a single taxon, Imboden Fork's loss of six taxa between seasons was notable. Despite the mayfly taxa reduction, the number of individuals was equal (N=248) among seasons in Imboden Fork samples. As was the case with the East Fork samples, stoneflies were reduced the most among the three EPT taxa groups, falling from eight genera in spring to two in fall samples. The number of caddisfly taxa also was reduced from spring to fall at Imboden Fork, a trend similar to that of most of the

remaining stations, but the percentage of the sample that caddisflies made up in fall 2007 was not appreciably lower than spring. One of the three genera present at Imboden Fork, *Polycentropus*, accounted for 74 percent of caddisflies found at this station, in comparison to the spring sample in which no single caddisfly taxon was dominant.

5.3.3 Black River Sample Stations

Black River spring 2007 single habitat macroinvertebrate samples averaged 45 total taxa (range 41-49), with Taxa Richness being highest at Station 3 and lowest at Station 2 (Table 20). There were a total of 22 EPT Taxa with the mayfly family Ephemerellidae being the dominant family (made up almost entirely by *Ephemerella invaria*) at each Black River station. More mayfly taxa occurred at Station 1, but the percentage of mayflies making up Black River samples was highest at Station 2. The number of mayfly taxa at Black River Station 1 was highest among all coarse substrate samples, including the East Fork and tributary stations. The number of mayfly taxa at the remaining Black River stations was higher than or equal to most East Fork and tributary stations. Mayflies made up the highest percentage of the sample at Black River Station 2, with over 60 percent of the sample being mayflies. Stations 1 and 3 had nearly equal percentages of mayflies, where they made up nearly half the samples. Stations 2 and 3 had stonefly taxa numbers that were similar to one another and were comparable to the East Fork and tributary stations. Station 1 had three stonefly taxa, the fewest of all coarse substrate samples except East Fork Station 3, with which it was tied. The percentage of stoneflies was nearly identical among Black River stations and, despite having relatively few taxa, stoneflies accounted for a similar percentage of the sample as the three downstream East Fork stations. The genus *Perlesta* was the most abundant stonefly taxon at each Black River station, but considering that each of these stations had fewer than 20 stonefly individuals in the samples, it was not a substantial contribution. The number of Black River caddisfly taxa tended to be comparable to one another and to the East Fork and tributary stations. Caddisflies made up a slightly higher percentage at Station 3 compared to the remaining Black River samples downstream. Chironomids were a much less prevalent taxa group among Black River stations compared to the East Fork in spring 2007. Despite being present in lower numbers, the number of chironomid taxa was notably lower only at Station 2 than the remaining stations. Although chironomids were more abundant in East Fork multiple habitat samples, they were present in coarse substrate habitat in varying numbers. For example, roughly 40 percent of chironomids present in East Fork Stations 1, 5, and 8 occurred in coarse substrate; however at Stations 3 and 7 only about 15 percent occurred in coarse substrate, indicating that chironomids were more abundant in nonflow and rootmat habitats at these two stations. By comparison, Black River coarse substrate habitat had far fewer chironomids than all East Fork sites, except Stations 3 and 7, where they were somewhat comparable.

Table 20
Spring 2007 Black River Macroinvertebrate Composition

↓Variable | Station→	1	2	3
Taxa Richness	49	41	46
Number EPT Taxa	22	22	22
% Ephemeroptera	49.8	60.8	45.1
% Plecoptera	2.4	2.7	2.5
% Trichoptera	7.2	7.8	9.4
MSCI Score	18	16	16
% Dominant Families			
Ephemerellidae	27.4	38.5	28.5
Elmidae	21.9	17.6	23.5
Heptageniidae	14.6	11.1	8.4
Chironomidae	8.1	--	10.9
Hydropsychidae	5.5	7.2	7.8
Isonychiidae	--	6.3	--

Black River fall 2007 single habitat macroinvertebrate samples averaged 45 total taxa (range 43-46); Station 1 and Station 2 each had equal Taxa Richness values of 46 (Table 21). The number of EPT Taxa averaged 21.3 (range 21 to 23), was highest at Station 1, and lowest at Station 3. Riffle beetles (Elmidae), most of which were *Stenelmis* and *Optioservus sandersoni*, were dominant at each Black River station, making up nearly half the sample at Station 3. At Stations 1 and 2 the remaining top five dominant families were made up of mayflies (Heptageniidae, Baetidae, and Isonychiidae) and Chironomidae. At Black River Station 3, Helicopsychidae were slightly more abundant and were ranked among the dominant families. There were equal numbers of mayfly taxa at Stations 1 and 2; these two Black River stations had mayfly taxa richness roughly equal to coarse substrate samples from the East Fork and tributary stations. In contrast to the East Fork and tributary stations, where two species accounted for the majority of mayflies, no single mayfly taxa group was consistently dominant among the Black River stations. The number of stonefly taxa was lower in fall 2007 than spring. As with spring, Black River Station 1 had the fewest stonefly taxa, but the number of stonefly individuals collected was nearly equal among stations. The number of caddisfly taxa was slightly higher in fall samples at Stations 1 and 3 compared to spring. Station 2, however, had half as many caddisfly taxa in the fall sample. In addition, whereas *Helicopsyche* made up 33.1 percent of caddisflies at Station 1 and 80.7 percent at Station 3, it was absent from Station 2. Black River Stations 1 and 3 had as many or more caddisfly taxa as the coarse substrate from any of the remaining stations in this study. By comparison, with only three caddisfly taxa, Black River Station 2 had among the lowest. The number of chironomids was mostly unchanged at Black River Stations 1 and 2; Station 3, however had fewer individuals than spring. In fall 2007, chironomids were more equitably distributed in coarse substrate habitat, with fewer chironomids present in each of the 13 stations in this study compared to spring, with the exception of Black River Stations 1

and 2. The disparity between chironomid abundance in Black River and East Fork samples was not observed in fall samples.

Table 21
Fall 2007 Black River Macroinvertebrate Composition

↓Variable | Station→	1	2	3
Taxa Richness	46	46	43
Number EPT Taxa	23	21	20
% Ephemeroptera	32.2	44.8	27.7
% Plecoptera	0.4	1.3	0.5
% Trichoptera	12.9	4.1	13.0
MSCI Score	18	18	20
% Dominant Families			
Elmidae	37.4	32.4	46.2
Heptageniidae	15.0	20.1	5.9
Baetidae	7.2	13.2	10.6
Chironomidae	6.0	6.1	--
Isonychiidae	5.2	15.3	7.2
Helicopsychidae	--	--	10.5

6.0 Data Trends

The AmerenUE Upper Taum Sauk Reservoir failure resulted in substantial physical damage to the East Fork Black River within JSISP. In addition, sediment passed through the Lower Taum Sauk Reservoir dam causing benthic habitat changes in the lower East Fork (McCord 2007, Michaelson 2007, Michaelson and Gullic 2008). Active and passive remedial efforts have been implemented to restore channel stability and aquatic habitat quality both within JSISP (river channel construction and sediment removal) and downstream of the Lower Reservoir (allowing the Lower Reservoir to be overtopped by high flow events to scour fine sediment). Biological assessment is one component that will be used to gauge the degree of success of these efforts. Beginning with this report, trends for certain benchmark data—specifically, water quality, biological assessment metrics, and macroinvertebrate community composition—will be presented as a means of demonstrating changes in water quality and the benthic macroinvertebrate community over time.

6.1 Water Quality

Most water quality parameters sampled between fall 2005 and fall 2007 (Table 22) exhibited fluctuations that are typical of seasonal or diel patterns. Changes among years in flow, temperature, dissolved oxygen, and conductivity (other factors being equal, conductivity tends to be higher during low flow conditions) can be explained by differences in rainfall patterns and, for the lower East Fork Black River, water release cycles from the Lower Taum Sauk Reservoir. Turbidity appears to be the only parameter

that has been consistently higher in the lower East Fork since the 2005 Upper Reservoir breach. Turbidity upstream of the Lower Reservoir is situational. Samples collected within and downstream of construction activities and the JSISP stream restoration project tended to have higher turbidity than the control station (Station 8) or the station located downstream of the park at the AmerenUE property boundary (Station 4).

Nutrient parameters were not collected in the spring 2006 field season. Turbidity and field parameters were measured and are available for comparison (Table 23). Turbidity readings among East Fork stations downstream of the Lower Reservoir were lower in spring 2007 than 2006. As with the fall samples, spring turbidity readings consistently increased in slight increments while progressing upstream from Station 1 to Station 3. For stations located upstream of the Lower Reservoir, turbidity readings also were lower in 2007, likely due to reduced flows compared to 2006 conditions. All Black River stations consistently had turbidity readings of 1.00 NTU or lower in fall samples during both years. Turbidity in spring downstream of the East Fork confluence (Black River Stations 1 and 2) was higher in 2006 and, to a lesser degree, in 2007 compared to Black River Station 3, which is located upstream of the East Fork confluence.

6.2 Biological Assessment

6.2.1 Biological Metrics

Macroinvertebrate Stream Condition Index (MSCI) scores, which are multi-metric composite scores made up of Taxa Richness, EPT Taxa, Shannon Diversity Index, and Biotic Index, varied seasonally and by station. In the lower East Fork pre-event conditions are available only for the fall macroinvertebrate community. Fall samples were collected in 2005 prior to the collapse of the Upper Reservoir as part of another study. In the upper East Fork the site currently referred to as Station 6 within JSISP represents the same East Fork Black River reach that had been a Biological Criteria Reference site. Samples were collected at this station in fall 2005, spring 2000, fall 2000, spring 1999, and fall 1999. Macroinvertebrate data from these samples will serve as a baseline for future assessment of the river restoration project within JSISP.

Lower East Fork fall MSCI scores were similar at Stations 1 and 2 for all three fall sample events. With the exception of a single 2005 MSCI score of 16 at Station 2, all remaining scores were 18 (Figure 1). Station 3 exhibited more variability, rating a partially supporting score of 12 in fall 2005 and increasing in both 2006 and 2007. In the upper East Fork, Station 6 is the only site that was affected by the erosive force of the Upper Reservoir breach for which spring and fall data exist prior to the failure. For purposes of this report, data from fall 2005 will be the earliest used. Upon completion of the channel restoration project in 2008, twice annual biological monitoring is planned for approximately five years and periodically after that. An assessment using all available data for this reach will be conducted at the end of the five year time frame.

Table 22
Fall Water Quality Parameters

	East Fork Black River																		Black River					
Station	1			2			3			4		5		6			8		1		2		3	
Parameter ↓ Year →	2005	2006	2007	2005	2006	2007	2005	2006	2007	2006	2007	2006	2007	2005	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
Flow (cfs)	13.4	2.9	90.0	13.4	3.0	54.1	13.2	7.1	50.3	3.6	17.9	3.6	15.2	9.0	0.5	23.0	0.6	5.3	126.0	217	126.0	217	123.0	127
Temp (°F)	26.0	15.0	22.9	26.5	16.5	24.1	27.5	16.5	21.7	20.5	22.6	16.0	25.6	25.5	23.0	25.4	17.0	20.0	20.5	19.3	21.0	20.6	21.0	22.1
D.O. (mg/L)	7.24	7.54	9.06	7.85	8.19	8.76	7.34	8.30	8.04	9.80	9.56	8.31	8.66	7.57	2.27	9.24	7.15	7.27	8.90	9.18	9.25	9.70	9.12	9.45
Cond. (µS/cm)	183	254	136	183	268	134	184	273	130	270	199	323	202	220	355	187	254	183	327	285	368	290	375	340
pH	8.3	7.9	7.77	8.3	8.1	7.91	8.2	7.7	7.56	8.2	8.11	7.6	7.88	8.4	7.1	7.99	8.0	7.58	8.1	7.72	8.2	7.98	8.1	8.17
Turb. (NTU)	1.00	4.02	5.42	1.00	6.66	6.01	2.00	53.3	10.2	1.00	1.00	1.57	1.00	2.00	22.2	1.00	1.19	1.00	1.00	1.00	1.00	1.00	1.00	1.00
NH_3-N (mg/L)	†	†	†	†	†	†	†	0.53	†	†	†	†	†	0.06	0.19	†	†	†	†	†	†	†	†	0.05
NO_2+NO_3-N (mg/L)	0.03*	0.20	0.09	0.02*	0.25	0.08	0.04*	0.08	0.07	0.16	0.13	0.09	0.14	†	†	0.11	0.01*	0.15	0.05*	0.26	0.03*	0.28	0.04	0.31
Ttl. Nitrogen (mg/L)	0.09	0.33	0.22	0.09	0.41	0.22	0.15	0.84	0.29	0.26	0.19	0.14	0.20	0.07	0.20	0.17	0.06	0.20	0.16	0.32	0.09	0.35	0.09	0.38
Ttl. Phos. (mg/L)	†	†	†	†	†	†	†	†	†	†	†	†	†	0.77	†	†	†	†	0.02*	†	†	†	†	†
Chloride (mg/L)	1.57*	2.35*	1.33*	1.57*	2.33*	1.38	1.47*	2.43*	1.34	2.24*	2.39*	2.31*	2.49	2.00*	2.35*	2.48*	2.35*	3.04*	4.57*	4.02	6.36	6.17	6.48	5.94

† Below detectable limits
* Estimated value, detected below Practical Quantitation Limits

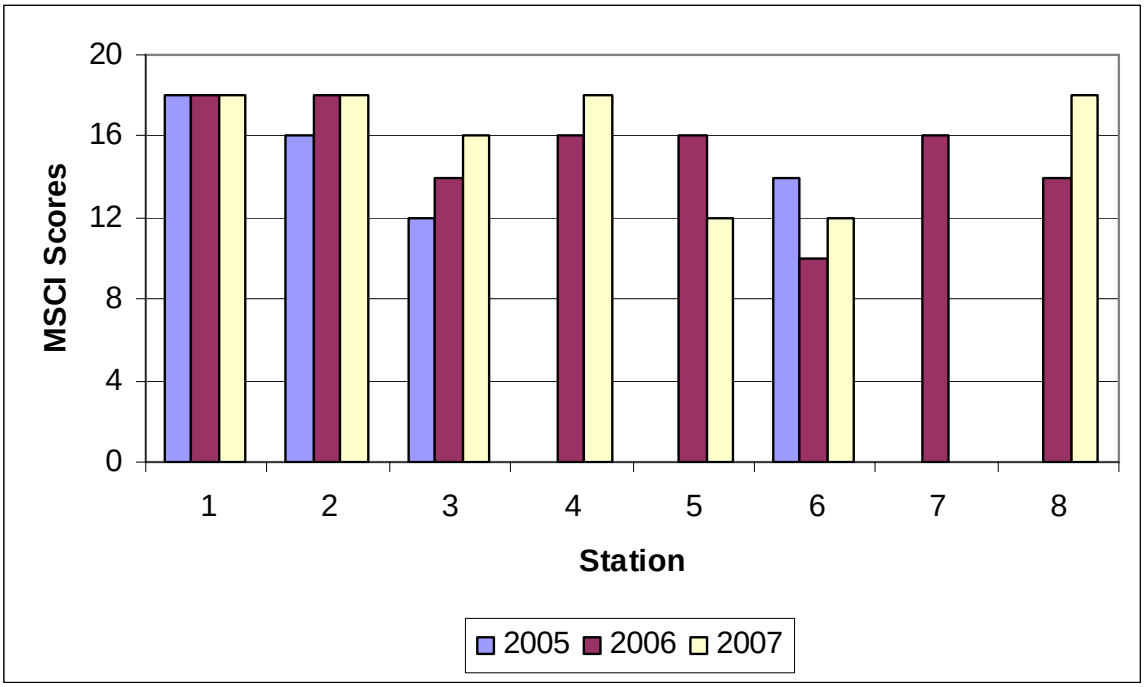
Table 23
Spring Water Quality Parameters

	East Fork Black River														Black River					
Station	1		2		3		4		5		6		8		1		2		3	
Parameter ↓ Year →	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007	2006	2007
Flow (cfs)	111	44.0	108	42.9	110	53.0	164	28.3	170	25.8	2.1	*	69.6	13.4	653	284	653	284	397	240
Temp (°F)	8.2	11.0	9.1	10.8	9.4	11.9	6.5	11.1	6.5	11.3	8.7	*	6.5	11.0	7.9	10.7	8.1	10.4	7.9	10.7
D.O. (mg/L)	10.8	10.4	10.6	10.9	10.9	11.2	11.7	10.7	11.3	11.1	6.52	*	11.8	11.3	11.3	11.3	11.2	11.8	11.3	12.1
Cond. (µS/cm)	102	143	99.8	141	99.2	136	127	145	123	145	168	*	121	132	219	249	226	258	281	284
pH	8.20	7.42	8.10	7.69	8.05	7.98	7.67	7.90	7.70	7.79	7.37	*	7.77	7.93	7.86	7.92	7.92	8.06	8.15	8.17
Turb. (NTU)	32.3	6.71	33.5	7.90	37.9	8.97	8.81	5.20	21.0	14.5	35.4	*	3.14	1.00	5.68	1.06	6.39	1.44	1.00	1.00

* Station under construction and dewatered

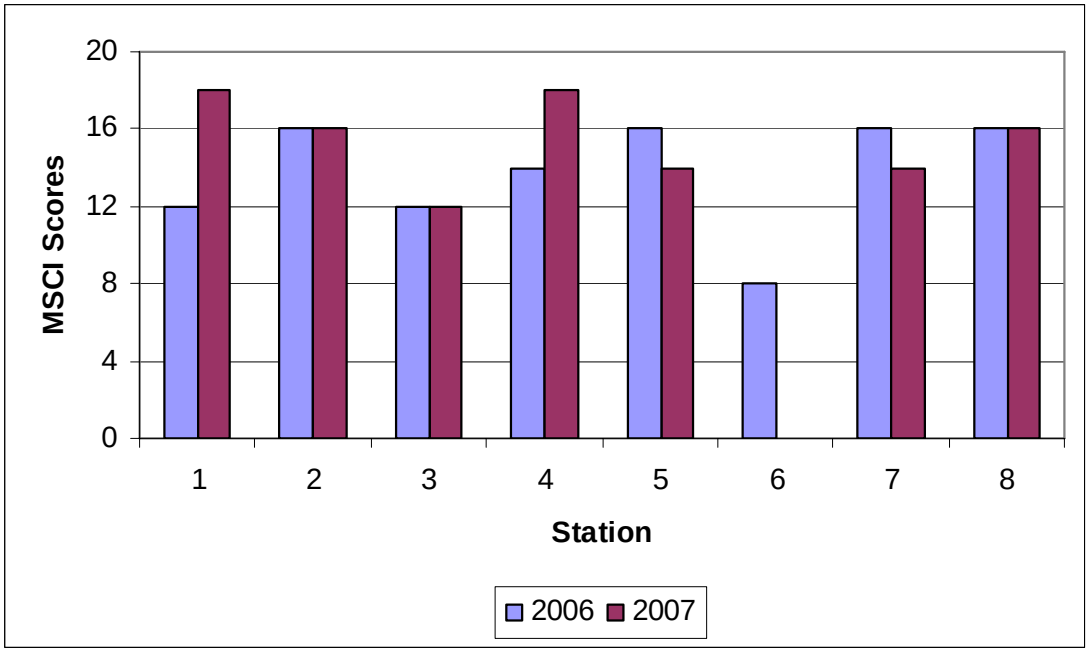
Fall MSCI scores of stations downstream of the Lower Reservoir were lowest at Station 3 in 2005 (Figure 1). Station 3 consistently has had lower MSCI scores than the remaining downstream stations, but has shown incremental improvement during each sample season. Stations 1 and 2 have been more consistent over time, with the Station 1 MSCI score being unchanged over three years. Fall MSCI scores of sites located upstream of the Lower Reservoir (Stations 4-8) were mostly consistent in fall 2006, with the exception of Station 6. During fall 2007, however, stations located within JSISP (Stations 5 and 6) were lower than the remaining upstream stations. The following fall samples are presented for Station 6: 2005 pre-event data; 2006 "West Channel" data during which time the majority of East Fork flow was directed away from the original channel and into the secondary high flow channel at Station 7; and 2007, which represents macroinvertebrate recolonization that occurred between April (when East Fork flow was directed into the newly-constructed channel) and September 2007.

Figure 1
East Fork Black River Fall Macroinvertebrate Stream Condition Index Scores



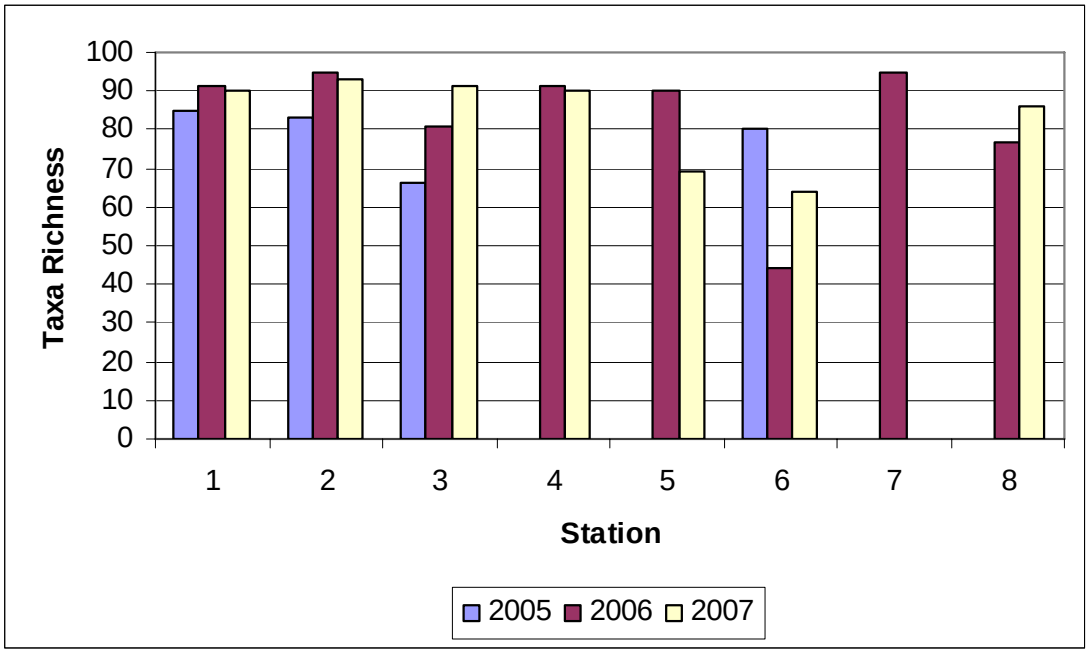
Spring MSCI scores for stations downstream of the Lower Reservoir were lowest at Station 1 in 2006 and at Station 3, where MSCI scores were equal for 2006 and 2007 (Figure 2). Station 1 achieved only a partially supporting score during the first sample season following the Upper Reservoir breach (spring 2006) and increased to fully supporting status in spring 2007. The remaining lower river stations were unchanged among years. Station 4 also had a higher MSCI score in 2007, increasing from a partially to a fully supporting score. The remaining upstream stations either were unchanged among years (Station 8) or decreased slightly from 2006 to 2007. Station 6, for which there is only a single spring sample, achieved a non-supporting score of 8 in spring 2006.

Figure 2
East Fork Black River Spring Macroinvertebrate Stream Condition Index Scores



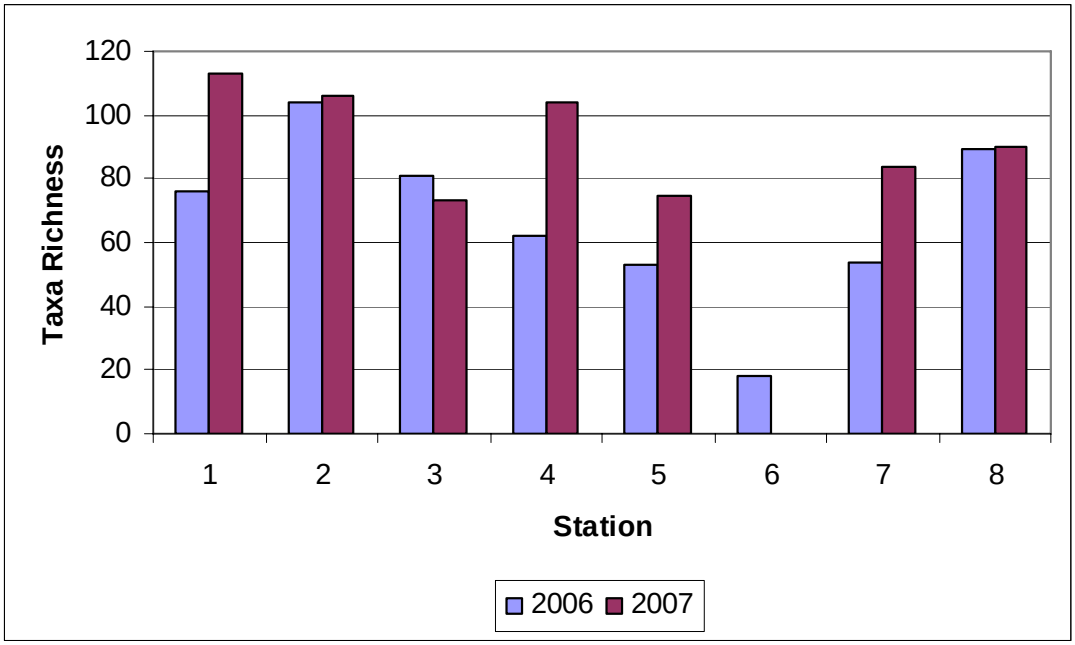
With a few exceptions, fall Taxa Richness values were comparable among East Fork Black River stations (Figure 3). For stations downstream of the Lower Reservoir, Station 3 exhibited a steady increase from 2005 to 2007, mirroring the MSCI score pattern for this site. Although Taxa Richness for Stations 1 and 2 were more even among years compared to Station 3, both sites had more taxa in 2006 and 2007. For 2006 samples, Stations 4, 5, and 7 had nearly identical Taxa Richness values. Station 4 Taxa Richness was nearly unchanged between the two years, but Station 5 had 21 fewer taxa in 2007 than 2006 and Station 8 had a slight increase. Station 6 had roughly half the number of taxa in 2006 compared to the pre-event fall 2005 sampling. Given roughly five months for macroinvertebrate recolonization in the restored channel, Station 6 Taxa Richness showed signs of improvement in fall 2007.

Figure 3
East Fork Black River Fall Taxa Richness Values



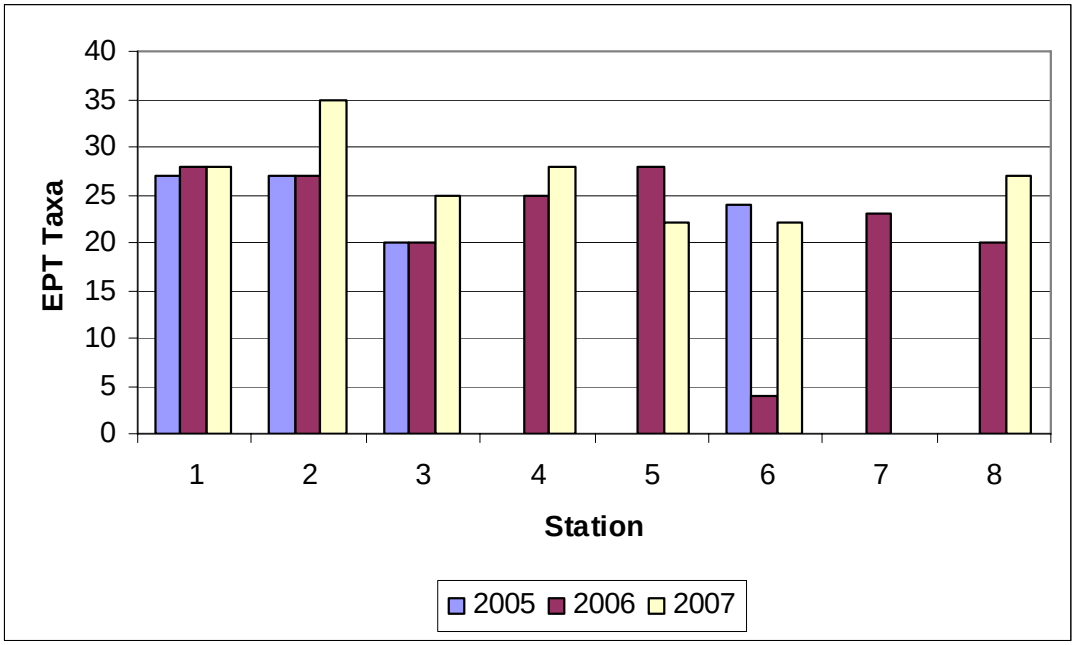
Most stations had a higher Taxa Richness in spring 2007 than 2006 (Figure 4). Only Station 3 had fewer taxa in 2007; Stations 2 and 8 were mostly unchanged. Station 4 had the largest increase (42 more taxa in 2007 than 2006), followed by Station 1 (37 more taxa in 2007). Station 6 had only 18 taxa following the breach.

Figure 4
East Fork Black River Spring Taxa Richness Values



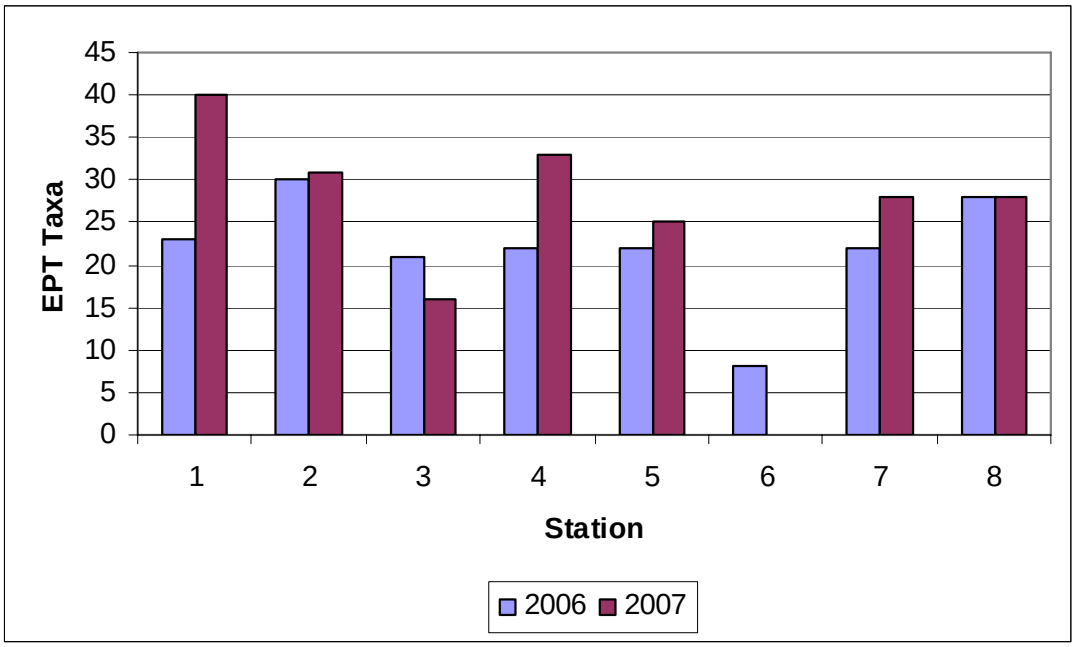
Fall EPT Taxa values were highest in 2007 at Stations 2, 3, 4, and 8 compared to samples from previous years (Figure 5). Station 1 EPT Taxa values were largely unchanged among three spring sample seasons. For Stations 2 and 3, EPT Taxa values were unchanged between 2005 and 2006; in 2007, however Station 2 increased by 8 and Station 3 increased by 5 EPT taxa. Station 8 had a comparable EPT taxa pattern, with 7 more in 2007 than 2006. Station 5 was the only site for which a decrease in EPT taxa occurred. Surprisingly, after having only 4 EPT Taxa in 2006, Station 6 had nearly the same number of EPT taxa in the restored channel in 2007 as was collected in 2005 when the site served as a Biological Criteria Reference reach.

Figure 5
East Fork Black River Fall EPT Taxa Values



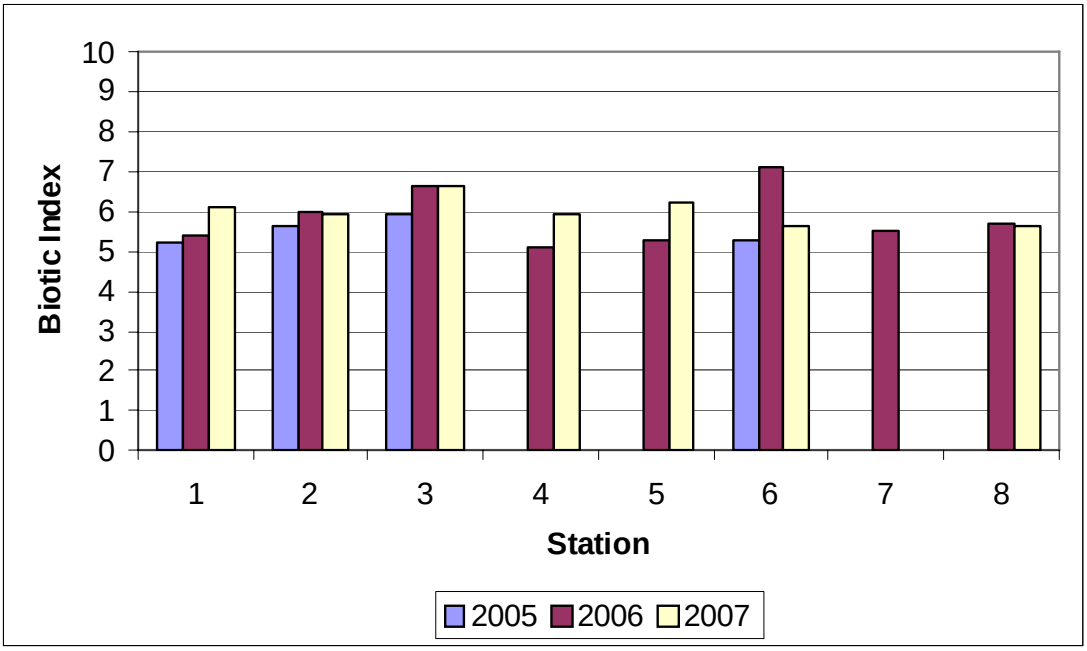
As was the case with spring Taxa Richness trends, each station had higher or nearly equal spring EPT Taxa values in 2007 than 2006 with the exception of Station 3, which had fewer EPT Taxa in 2007 (Figure 6). The largest increase occurred at Station 1, which increased from 23 to 40 EPT Taxa in this time period; the second highest occurred at Station 4, which increased by 11 EPT Taxa. Each of the remaining stations, except Station 3, increased slightly or remained mostly unchanged. Station 3 experienced a slight decline (5 fewer) in EPT Taxa, accounting for nearly the entire Taxa Richness decline (6 fewer) between 2006 and 2007.

Figure 6
East Fork Black River Spring EPT Taxa Values



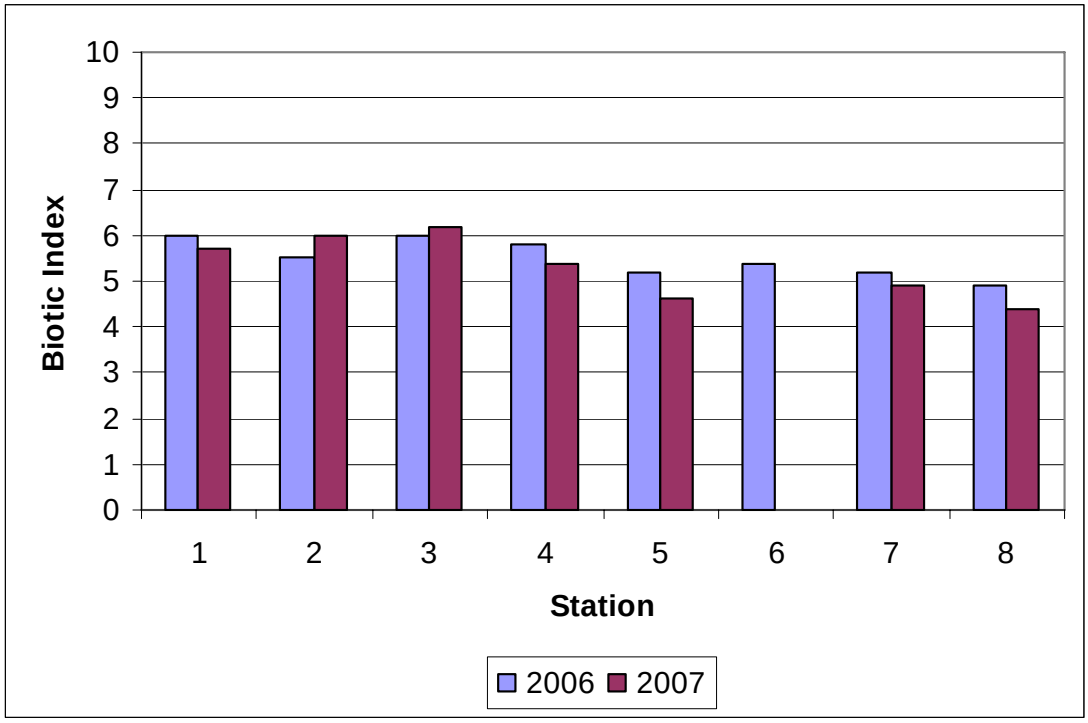
Although fall Biotic Index values tended to be higher in 2006 and 2007 compared to 2005, it should be noted that the overall differences presented in Figure 7 were small and despite the relative sizes of the histograms, each of the fall Biotic Index scores was the same, regardless of station or year. For sites downstream of the Lower Reservoir, Stations 1 and 3 exhibited an increase in Biotic Index over time, although this trend was not as noticeable at Station 1 until 2007. Station 3 2006 and 2007 Biotic Index values were equal among years and were higher than in 2005. Stations 4 and 5 each experienced a Biotic Index increase from 2006 to 2007. Station 6 showed the largest variability in Biotic Index. Given the extreme changes this station experienced during this time period (reference quality in 2005; shallow, warm, and hypoxic in 2006; and newly-renovated stream channel in 2007) a higher Biotic Index in 2006 was expected.

Figure 7
East Fork Black River Fall Biotic Index Values



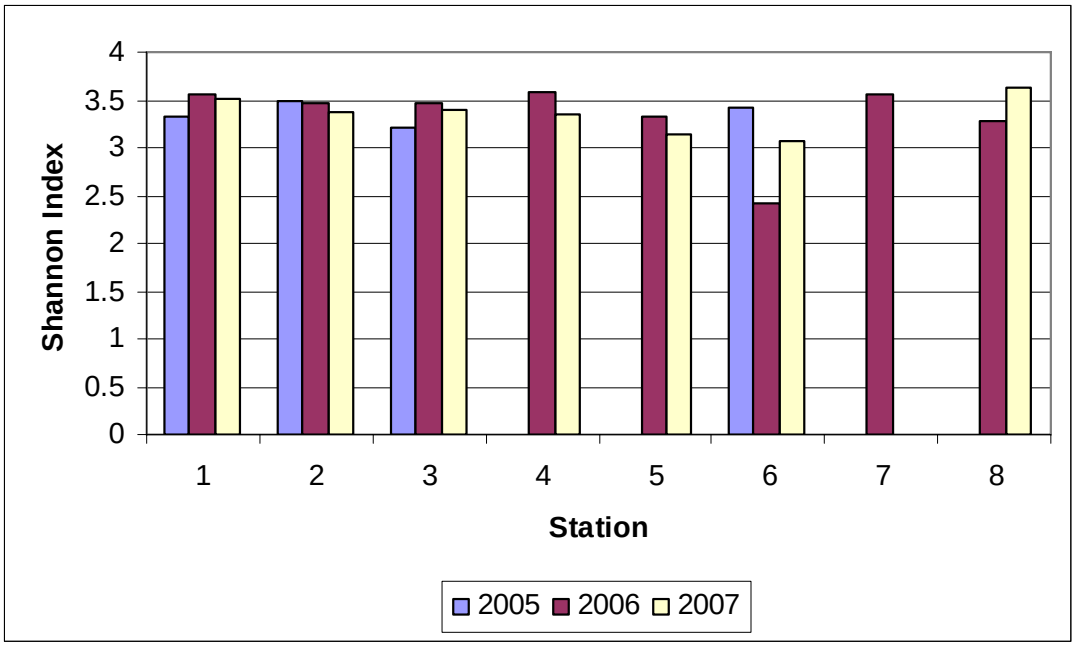
Spring Biotic Index values exhibited a trend opposite that of the fall data at most stations, with 2007 having lower values than 2006 (Figure 8). Stations 2 and 3 were the exceptions, each of which had slightly higher Biotic Index values in 2007. Despite the changes in values among years, the Biotic Index score of each station remained the same from year to year. Stations 5, 7, and 8 each had lower Biotic Index values than the remaining stations and contributed scores of 5 (the highest possible for the individual metric) toward the overall MSCI score in both 2006 and 2007.

Figure 8
East Fork Black River Spring Biotic Index Values



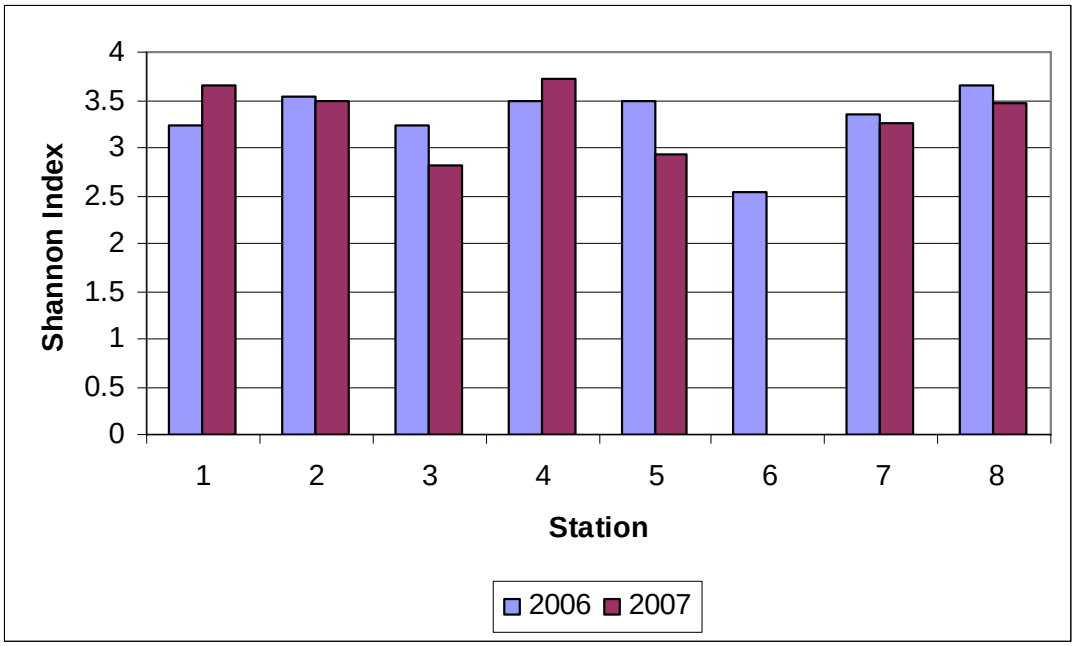
Fall Shannon Diversity Index values were fairly consistent among stations and among years (Figure 9). Only at Stations 5 (2007) and 6 (2006 and 2007) were SDI values sufficiently low to achieve a score of 3; the remaining stations had SCI scores of 5 for each year. The lowest SDI value occurred during the fall of 2006 at Station 6, a trend similar to Taxa Richness and EPT Taxa.

Figure 9
East Fork Black River Fall Shannon Diversity Index Values



Spring SDI values were more variable within stations among years compared to the fall and did not consistently fluctuate based on the year or the location in which the sample was collected (Figure 10). Unlike the fall data, more stations had one year in which SDI values were low enough to merit a score of 3. Stations 1, 3, 5, 6, and 7 each had an SDI score of 3 in one sample year, but not both.

Figure 10
East Fork Black River Spring Shannon Diversity Index Values



6.2.2 Macroinvertebrate Community Composition Trends

In the previous biological assessment report (Michaelson 2007), macroinvertebrate community composition of fall 2005 was compared to the post-event community of fall 2006 among stations downstream of the Lower Taum Sauk Reservoir dam. In this comparison, the report states that the "macroinvertebrate community composition was similar among fall samples at Stations 1 and 2. Exceptions were that the family Chironomidae was represented by more taxa and, in some habitats, more individuals." The 2007 report also states that, among East Fork stations downstream of the Lower Reservoir, Station 3 exhibited more differences in the post-event fall 2006 macroinvertebrate community composition than the remaining downstream stations when compared to fall 2005. These differences include:

- more diversity and abundance within the family Chironomidae;
- increased mayfly taxa richness in coarse substrate habitat;
- a dramatic decline of mayfly abundance in rootmat habitat;
- a decline of mayfly taxa richness and abundance in nonflow habitat;

- a decreased number of caddisfly individuals in coarse substrate habitat with an unchanged caddisfly taxa richness; and
- a decrease in the number of caddisfly taxa and abundance in rootmat habitat.

Several trends noted in the preceding paragraph also were observed in 2007 samples; other trends, however, were not. A station-by-station comparison of the fall 2005 versus fall 2007 macroinvertebrate community composition will be presented in later paragraphs and in Tables 24 and 25 following the narrative for each station. In addition, pre-event data from the former Biological Criteria Reference reach (2005 Station 4) will be compared to the newly-rehabilitated reach of Station 6. First, however, the trends noted above for Station 3 will be addressed in a similar format for comparing 2005 with 2007 data:

- although fall 2007 chironomid taxa richness was greater than fall 2005, they were less abundant and made up a smaller percentage of all lower East Fork fall 2007 samples;
- chironomids were slightly less abundant at Station 3 in 2007 than 2005, but were represented by more taxa;
- mayfly taxa richness was higher in 2007 Station 3 coarse substrate habitat;
- Station 3 mayfly abundance in rootmat habitat was slightly higher in 2007;
- mayfly taxa richness and abundance in Station 3 nonflow habitat was lower in 2007;
- caddisfly abundance was lower in 2007 Station 3 coarse substrate, but caddisfly taxa richness was higher than 2005;
- Station 3 rootmat had slightly lower caddisfly abundance and taxa richness in 2007 compared to 2005.

East Fork Black River Station 1

Station 1 had equal numbers of mayfly taxa (18) in fall 2005 and fall 2007 samples, but lower numbers of individuals were observed only in coarse substrate habitat. Despite lower numbers of individuals, however, mayflies accounted for only a slightly lower percentage of the total sample in 2007 (40.3 percent) than 2005 (48.1 percent). Stoneflies were equally rare with comparable numbers of taxa for both sample years. Caddisflies were represented by three more taxa in 2007 than 2005, but fewer individuals were present in the sample. Only a small difference in the overall percent was observed, with caddisflies making up 4.2 percent in 2007 versus 5.5 percent in 2005. Taxa in the family Chironomidae were similar in 2005 and 2007 and, although fewer individuals were present in 2007, the overall percentage of chironomids in the sample was not appreciably lower (10.8 percent in 2005; 6.6 percent in 2007). Aquatic worms (including the families Tubificidae, Lumbriculidae, and order Lumbricina) were more abundant and made up a higher percentage of the 2007 sample than 2005. In 2005 aquatic worms made up 1.8 percent of the sample, whereas in 2007 they accounted for 8.0 percent. Mollusks (including all bivalves and gastropods) were more abundant in coarse substrate habitat in 2007, but abundance was equal among years for the remaining habitats.

East Fork Black River Station 2

Station 2 had slightly greater mayfly abundance and taxa richness (20 mayfly taxa in 2007 and 17 in 2005), but accounted for 51.6 percent of the 2007 sample. By comparison, in 2005 mayflies made up 39.1 percent. Stoneflies also were rare in Station 2 fall samples for both years, but the number of individuals and taxa was twice as high in 2007. In 2005 12 stoneflies of 2 taxa made up 0.9 percent of the sample; in 2007 24 stoneflies of 4 taxa made up 1.9 percent. Caddisflies were half as abundant in 2007 coarse substrate habitat, but were comparable for the remaining habitats. Caddisflies made up a lower percentage of the 2007 sample (5.5 percent) compared to 2005 (8.8 percent). Despite the lower number of caddisfly individuals, taxa richness for this group was higher in 2007 (10 caddisfly taxa in 2007, 7 in 2005). Chironomid abundance was much lower in 2007 coarse substrate habitat (37 in 2007, 124 in 2005), but the number of taxa was nearly equal for this habitat. Overall, there were three more chironomid taxa in the 2007 sample than in 2005. Whereas chironomids made up 16.8 percent of the 2005 sample, they accounted for only 9.1 percent in 2007.

East Fork Black River Station 3

With all three habitats combined, mayflies were present in comparable numbers and made up similar percentages of 2005 and 2007 samples. In addition, four more mayfly taxa were present in 2007 than 2005. Mayfly abundance and taxa richness in nonflow habitat, however, was notably lower in 2007 (159 mayfly individuals of 6 taxa in 2005 versus 68 mayflies of 3 taxa in 2007). Again, stoneflies were rare in fall samples, but taxa richness increased from a single stonefly taxon in 2005 to 3 taxa in 2007. Caddisflies were roughly half as abundant in 2007 and made up 7.7 percent of the sample compared to 17.1 percent in 2005. The largest decrease in caddisfly abundance occurred in the coarse substrate habitat; for the remaining habitats, caddisfly numbers were similar. Despite this decreased abundance, taxa richness for this group was nearly equal among years. Chironomid abundance was lower in 2007 coarse substrate and rootmat habitats than 2005, but was slightly higher in nonflow. Compared to 2005, chironomid taxa richness was higher in each of the three habitats and was particularly high with 23 taxa in 2007 nonflow habitat. With a total of 30 (8 more than 2005), Station 3 had the greatest chironomid taxa richness of the three downstream stations in 2007. As was the case in 2005, chironomids made up the highest percentage of the sample at Station 3 in 2007 (18.3 percent at Station 3, 9.1 percent at Station 2, and 7.0 percent at Station 1). Aquatic worms were more abundant at Station 3 in 2007 compared to 2005 by a factor of 10. This increase was observed only in coarse substrate and nonflow habitats. In 2005 only 2 individual worms were present in the coarse substrate sample and 8 in the nonflow; by contrast, in 2007 80 were present in coarse substrate and 50 in nonflow habitat. With this increased abundance, however, only one additional taxon was observed in 2007. Mollusks were present in greater numbers and diversity in 2007 samples. The greatest increase in abundance occurred in the coarse substrate sample, but each habitat experienced a higher number of mollusk taxa in 2007. Overall mollusk taxa richness increased from 2 in 2005 to 6 in 2007. Beetles (Coleoptera) exhibited a much lower abundance in the 2007 nonflow habitat sample. In 2005 45 individuals of a single taxon

(*Stenelmis*) were present in the nonflow habitat, but in 2007 only a single individual (of the same genus) was collected in this habitat. The remaining habitats demonstrated greater beetle abundance and, in the case of rootmat habitat, higher taxa richness in 2007.

East Fork Black River Station 6 (Station 4 during the 2005 sample season)

Mayflies were present in greater abundance and made up a higher percentage of the 2007 sample (40.6 percent in 2005, 66.4 percent in 2007), but mayfly taxa richness was equal among years with habitats combined. Mayfly taxa richness was higher in 2007 nonflow habitat, but equal among years for the remaining habitats. Mayflies were present in much higher numbers in 2007 rootmat habitat; whereas the rootmat portion of the sample held 6.9 percent of the total mayflies in 2005, it provided 25.3 percent in 2007. A total of three stoneflies were present in samples from both years. In 2005 stoneflies were represented by two taxa and in 2007 a single stonefly taxon was present. Caddisflies were somewhat less abundant in 2007 and made up a lower percentage of the sample compared to 2005 (12.8 percent in 2005, 7.2 percent in 2007). Despite the lower abundance, taxa richness was similar. In coarse substrate and nonflow habitats, caddisflies were present in similar abundance among years, but abundance was much reduced in rootmat habitat. Compared to 2005, in which 36 caddisflies of four taxa were present in rootmat, only a single individual was present in the 2007 rootmat sample. Beetles were approximately half as abundant in 2007 coarse substrate habitat, but were twice as abundant in nonflow. Despite the differences in abundance for these two habitats, taxa richness was similar. In rootmat habitat, however, although beetle abundance was similar among years, the number of taxa was much lower in 2007. For the overall sample, three fewer beetle taxa were present in 2007 compared to 2005. Although chironomid taxa richness was similar among years in coarse substrate and nonflow habitats, fewer chironomid taxa were present in 2007 rootmat habitat. Overall, however, chironomid abundance and taxa richness were comparable among years. Aquatic worms were present in relatively low abundance during both 2005 and 2007; however, taxa richness declined from four in 2005 to one in 2007. Aquatic worms were represented by only a single individual from each habitat in 2007. Mollusks also were present in low numbers during both years. Whereas rootmat habitat accounted for the majority of mollusk diversity and abundance in 2005, no mollusks were present in 2007 rootmat.

Table 24
Lower East Fork Black River Taxa Comparison: 2005 Pre-Event versus 2007 Post-Event*
Number of Individuals (Number of Taxa in Parentheses)

	Station 1								Station 2								Station 3							
	Fall 2005				Fall 2007				Fall 2005				Fall 2007				Fall 2005				Fall 2007			
	CS	NF	RM	Total	CS	NF	RM	Total	CS	NF	RM	Total	CS	NF	RM	Total	CS	NF	RM	Total	CS	NF	RM	Total
Ephem	383(14)	125(10)	214(9)	722(18)	185(14)	122(9)	185(7)	492(18)	239(13)	140(6)	134(5)	513(17)	241(14)	144(13)	244(5)	629(20)	123(9)	159(6)	113(4)	395(12)	138(13)	68(3)	166(6)	372(16)
Odonata	21(3)	10(3)	18(4)	49(7)	24(2)	26(3)	31(7)	81(9)	19(2)	5(4)	26(3)	53(5)	33(3)	10(2)	20(6)	63(8)	7(1)	5(1)	25(4)	37(4)	32(1)	7(2)	22(2)	61(4)
Plecop	7(2)	--	--	7(2)	11(1)	--	--	11(1)	12(2)	--	--	12(2)	24(4)	--	--	24(4)	16(1)	--	--	16(1)	11(3)	--	--	11(3)
Trichop	78(3)	--	5(3)	83(6)	32(6)	6(2)	14(4)	52(9)	104(5)	8(4)	4(2)	116(7)	51(6)	10(3)	12(3)	73(10)	188(2)	5(3)	29(5)	222(7)	82(4)	8(3)	13(4)	103(6)
Coleop	256(5)	37(4)	53(5)	346(8)	191(5)	43(4)	18(5)	252(8)	111(4)	81(4)	30(5)	222(7)	167(4)	13(3)	4(3)	184(6)	120(4)	45(1)	1(1)	166(4)	203(3)	1(1)	11(4)	215(6)
Chiro	56(10)	45(10)	61(14)	162(20)	42(13)	27(11)	17(8)	86(23)	124(9)	75(12)	22(10)	221(23)	37(10)	54(12)	21(11)	112(26)	78(9)	116(13)	147(11)	341(22)	41(13)	152(23)	50(14)	243(30)
Worms†	8(2)	10(1)	1(1)	19(2)	29(3)	68(3)	0(1)	97(4)	12(2)	11(3)	1(1)	24(4)	13(2)	20(2)	0(1)	33(3)	2(2)	8(3)	3(1)	13(4)	80(4)	50(4)	2(2)	132(5)
Mollusca	15(3)	14(2)	5(2)	34(4)	37(4)	14(2)	5(4)	56(5)	6(2)	8(2)	17(3)	31(6)	21(3)	1(1)	6(3)	28(6)	11(2)	16(2)	3(1)	30(2)	54(4)	11(4)	46(6)	111(6)

*excludes Hemiptera, Megaloptera, Lepidoptera, and "Other Diptera"; †"Aquatic worms" includes Tubificidae, Lumbriculidae, and Lumbricina

Table 25
East Fork Black River Station 4/Station 6 Taxa Comparison: 2005 Pre-Event versus 2007 Post-Event*
Number of Individuals (Number of Taxa in Parentheses)

	Fall 2005 (Station 4)				Fall 2007 (Station 6)			
	CS	NF	RM	Total	CS	NF	RM	Total
Ephem.	346(13)	113(4)	34(8)	493(17)	433(13)	202(8)	215(8)	850(17)
Odonata	21(2)	6(2)	31(6)	58(7)	6(2)	18(4)	5(4)	29(7)
Plecop.	3(2)	--	--	3(2)	2(1)	1(1)	--	3(1)
Trichop.	118(5)	2(1)	36(4)	156(5)	90(3)	2(1)	1(1)	93(4)
Coleop.	55(4)	9(3)	15(6)	79(8)	25(3)	23(4)	12(1)	60(5)
Chiro.	66(10)	110(9)	48(14)	224(20)	87(9)	26(9)	79(10)	192(18)
Worms†	4(2)	9(3)	1(1)	14(4)	1(1)	1(1)	1(1)	3(1)
Mollusca	0(1 Large/Rare)	1(1)	7(4)	8(4)	2(2)	5(1)	--	7(2)

*excludes Hemiptera, Megaloptera, Lepidoptera, and "Other Diptera"; †"Aquatic worms" includes Tubificidae, Lumbriculidae, and Lumbricina

6.2.3 Macroinvertebrate Quantitative Similarity Index

The Quantitative Similarity Index (**QSI**) compares two aquatic communities in terms of presence or absence of taxa, also taking relative abundance (percent composition) of each taxa into account (MDNR 2003a). Values range from 0 to 100 percent. Identical communities have a QSI of 100 percent, whereas totally different communities have a value of 0 percent. Although the QSI can be used for several applications where a comparison of overall macroinvertebrate community composition is required, pre-event data from each of the four EFBR samples collected in fall 2005 will be compared to 2007 sample data to determine the degree to which the macroinvertebrate community has changed. To provide some perspective, a QSI rating of 70 percent is considered the minimum standard in the SMSBPP when conducting side-by-side duplicative sampling for quality assurance purposes, although other states' biological monitoring programs have an acceptable range of 60 to 85 percent (MDNR 2003a).

As compared to fall 2005, the Quantitative Similarity Index increased from fall 2006 to fall 2007 for all stations and was highest at Stations 1 and 2 (Table 26). As expected, the lowest QSI of 12.3 percent occurred when comparing post-event 2006 data with the 2005 reference reach (Station 4/6). By fall 2007, following the Upper Reservoir breach and river channel restoration, Station 6 was more similar to fall 2005 (55.7 percent) than Station 3 (52.9 percent). The QSI along with community composition attributes will be used in upcoming EFBR studies to assist in determining the status of the restored river reach.

Table 26
East Fork Black River Quantitative Similarity Index,
Fall 2005 Data Compared to Fall 2006 and Fall 2007

Station	Fall 2006	Fall 2007
1	63.9	68.3
2	56.2	67.4
3	44.0	52.9
4(6)	12.3	55.7

7.0 Discussion

7.1 Water Quality

Water quality parameters generally were similar among stations with only a few exceptions and were comparable to post-event levels from 2006. Flow measured in spring 2007 among lower EFBR stations—downstream of the Lower Taum Sauk Reservoir dam—was roughly half of that measured during spring 2006. Among the remaining East Fork, Black River, and tributary stations, spring 2007 flow rates were a fraction of spring 2006 flows. In contrast, fall 2007 EFBR and tributary stations were

generally higher than 2006 flows. Among Black River stations, fall 2006 flow was roughly half that of 2007 at Stations 1 and 2, but at Black River Station 3 the 2006 and 2007 flow rates were nearly the same.

Turbidity was higher among EFBR stations downstream of the Lower Reservoir compared to the remaining upstream stations during both 2007 seasons, with the exception that Station 5 was higher in spring due to river restoration construction activity occurring within JSISP a short distance upstream from where the sample was collected. Once the new channel was established along the Station 6 reach in April 2007, regular heavy equipment access to the river was discontinued and turbidity downstream at Station 5 fell to levels comparable to the upstream control and tributary stations. As was the case in 2006, turbidity among stations downstream of the Lower Reservoir were highest at Station 3, nearest the dam, and lower at Stations 1 and 2. Unlike fall 2006, which had a large turbidity reduction between Station 3 (53.3 NTU) and Station 2 (6.66 NTU), turbidity levels decreased more gradually while progressing downstream in fall 2007. Given the large difference in flow between the two years, it is likely that the higher flows of 2007 resulted in turbulence that kept particulate matter in suspension throughout the lower river reach and attenuated any abrupt drop in turbidity that may otherwise have occurred. The East Fork may have increased Black River turbidity in spring 2007, but only minimally. Compared to spring 2006, when turbidity increased between Station 3 (1.00 NTU) and Station 2 (6.39 NTU), turbidity between the two stations only increased from 1.00 NTU to 1.44 NTU in spring 2007. During fall 2007, turbidity among Black River stations was equal (1.00 NTU) regardless of the East Fork confluence and despite higher flows.

Conductivity, chloride, total nitrogen, and nitrite+nitrate as nitrogen concentrations all were higher in the Black River than among the East Fork stations. Similar to 2006 readings, however, conductivity was higher at Black River Station 3 than at the remaining stations downstream of the East Fork confluence during both 2007 sample seasons. Despite having occurrences of higher relative turbidity, the East Fork appears to dilute electrolytic compounds in the Black River, resulting in slightly lower conductivity at Black River Stations 1 and 2.

7.2 Biological Assessment

7.2.1 East Fork Black River

The macroinvertebrate community of the East Fork Black River downstream of the Lower Reservoir has exhibited at least one consistent trend over time: Stations 1 and 2 have tended to have more stable MSCI scores among seasons and score higher than Station 3, nearest the dam. Station 3 has exhibited more variability, but was able to achieve a fully supporting score in fall 2007. Future monitoring of this river reach should enable investigators to determine whether the macroinvertebrate community at Station 3 responds positively to expected decreases in turbidity and benthic sediment over time and

to a more naturally-functioning hydrograph, which may be a condition of AmerenUE's pending Federal Energy Regulatory Commission license. Future monitoring of East Fork Black River Station 6 (the former Biological Criteria Reference reach) also will be critical to observe the ecological succession of this reach following the river channel restoration project. Given that the reach achieved a partially supporting score within five months of the introduction of flowing water, a more diverse benthic community can be anticipated as the riparian corridor becomes more established. Although rootmat habitat was present in fall 2007, it was made up entirely of fibrous material that had grown from willow (*Salix* sp.) branch packings used for bank stability along the outside river bends. Over time, as trees become established along the banks the rootmat habitat should become more abundant and of better quality, providing for a more diverse array of macroinvertebrates.

Among East Fork Black River stations downstream of the Lower Reservoir, spring 2007 biological metrics were highest at the most downstream site and decreased in upstream stations. Station 3 had much lower Taxa Richness and EPT Taxa values and was the only station to achieve a partially supporting score in spring 2007. During the fall season, however, biological metrics and scores were more evenly distributed among the downstream stations. Station 3, which has consistently scored lowest among the three lower East Fork stations, achieved a fully supporting score in fall 2007, the first among five sampling events that began in fall 2005. These results are encouraging, suggesting that the macroinvertebrate community at Station 3 may be showing signs of improvement. This station has experienced the most extreme effects of the Upper Reservoir breach among lower river sites, mainly in the form of fine benthic sediment volume (McCord 2007). As a positive, however, the instream flow regime for the lower East Fork has not been in competition with hydroelectric generation since the Upper Reservoir breach and has experienced fewer abrupt interruptions in flow. The next several sampling seasons, before completion of the new Upper Reservoir and resumption of operations, will determine whether this single event becomes a continuing trend.

When considering the lower East Fork MSCI scores based on single habitat assessment criteria, Stations 2 and 3 each had lower spring nonflow scores in 2007 than any in 2006. It is difficult to determine the cause of the low nonflow scores at these sites. Although the spring 2007 samples would have reflected water quality and habitat conditions of winter 2006/2007, few extraordinary events would account for the macroinvertebrate scores for this specific habitat. During the winter of 2006/2007, the Lower Taum Sauk Reservoir was drained to allow equipment to remove benthic sediment and other material from the lake bed. In areas near the dam that could not be adequately drained to allow access for earth-moving machinery, a suction dredge was used briefly to pump sediment upstream into holding basins. Despite all this activity in the Lower Reservoir, sediment control and instream flow maintenance measures were monitored closely and proved effective in preventing excessive turbidity while maintaining sufficient flows in the East Fork downstream of the dam. Interestingly, the nonflow scores for fall 2007 at Stations 2 and 3 improved dramatically to surpass the score of Station 1, suggesting that the cause

of the low nonflow scores at these two stations had lessened. Future monitoring will be useful in determining whether these scores were anomalous, due to some unknown short-term factor, or a chronic condition requiring further investigation.

For stations located upstream of the Lower Taum Sauk Reservoir, only Stations 4 and 8 achieved fully supporting scores in spring 2007. Stations 5 and 7, located within JSISP and upstream of the shut-ins, were partially supporting, attributable to lower Taxa Richness and Shannon Diversity Index scores. These two stations were in the vicinity of construction activity to restore the park and, in the case of Station 7, had historically been a secondary high-flow channel that actually showed an increased Taxa Richness and number of EPT Taxa compared to spring 2006 data. Fall 2007 exhibited similar trends—stations located within JSISP (Station 5 and a return to Station 6) achieved partially supporting scores, whereas the remaining stations upstream of the Lower Reservoir were fully supporting. Station 7 was isolated from flowing water as a result of the river restoration project and will no longer be used as a monitoring station. Given that Station 6 was located within a newly-constructed channel that had been exposed to flowing water for only five months prior to the fall 2007 sample season, the macroinvertebrate community represented by the scores in Table 12 was encouraging. The diminished fall 2007 scores of Station 5, particularly of Taxa Richness (90 in fall 2006, 69 in fall 2007), may be attributable to increased sediment and turbidity associated with continued land disturbance during the East Fork Black River restoration project within the park. Continued monitoring of these stations will determine how well the community responds to a cessation of channel construction activities and succession over time.

7.2.2 East Fork Black River Tributaries and Control Station 8

Of the stations located higher in the watershed—East Fork Station 8 and the tributary stations, Taum Sauk Creek and Imboden Fork—Imboden Fork exhibited mostly the same biological metric pattern as was observed with 2006 samples. Imboden Fork again achieved fully supporting status in spring 2007 and partially supporting in fall 2007. Unlike the 2006 spring sample, however, Imboden Fork had a higher number of taxa than Taum Sauk Creek or East Fork Station 8 and actually had a Taxa Richness value that ranked among the highest of all spring 2007 samples. By contrast, East Fork Station 8 and Taum Sauk Creek biological metrics were more consistent among 2007 sample seasons and did not experience the decline that was observed at Imboden Fork in fall 2007. Although biological metrics from all three of these stations appear to be affected by low summer flows, Imboden Fork seems particularly susceptible and has exhibited the largest swing of any of the tributary or control stations.

7.2.3 Black River Sample Stations

The coarse substrate habitat of the three Black River stations was sampled again in 2007 to determine whether any possible sediment contribution from the East Fork Black River affected the biota downstream. The 2007 single-habitat MSCI scores of the three Black

River stations exhibited a pattern slightly different compared to spring 2006. In 2006 Station 2 (the first station downstream of the East Fork confluence) scored lower than either of the remaining Black River stations in both spring and fall, although it achieved partially-supporting status only in spring 2006. In spring 2007, however, Black River Stations 2 and 3 MSCI scores each had fully supporting scores of 16, with Station 1 scoring 18. The fall 2007 MSCI score for Station 2 also was higher than 2006. Stations 1 and 2 each had fully supporting fall 2007 MSCI scores of 18, with Station 3 scoring 20. There appears to be little difference in macroinvertebrate community composition and biological metric scores among the three Black River stations, regardless of their position relative to the East Fork confluence. With many nutrient water quality parameters being higher in the Black River and the turbidity contribution of the East Fork being minor, it is unlikely that the East Fork is negatively affecting the Black River macroinvertebrate community.

7.3 Macroinvertebrate Community Composition

7.3.1 East Fork Black River

Among lower East Fork stations, certain macroinvertebrate community composition differences remain the same compared to pre-event conditions. Other differences were not only less pronounced in the 2007 data, but in fact were opposite. As was discussed for 2006 data, these differences tend to be more evident at Station 3. One trend that was not observed in 2007 was with respect to chironomids. Compared to 2005, chironomid taxa richness was higher, but the number of individuals present in samples among all lower East Fork stations was far lower. The only other trend that had changed direction was with mayfly abundance in rootmat habitat at Station 3: whereas mayfly abundance was much lower in 2006 rootmat, in 2007 both abundance and taxa richness had rebounded and surpassed the 2005 levels. The only groups to experience this increased abundance and taxa richness in Station 3 rootmat were mayflies and mollusks, so it is unlikely that this observation was due simply to higher flows (and, presumably, more available rootmat habitat due to higher water levels).

7.3.2 East Fork Black River Tributaries

Taum Sauk Creek macroinvertebrate community composition was generally similar to that observed in East Fork Black River samples during both seasons in 2007. As with East Fork samples, chironomids were dominant in spring and caenid mayflies were dominant in the fall. Stoneflies were much more abundant and diverse in spring samples than fall, with caddisflies increasing in abundance in fall.

The Imboden Fork macroinvertebrate community composition shifted from the pattern observed at Taum Sauk Creek and most of the East Fork stations. Although Imboden Fork had some of the highest Taxa Richness values and an overall composition resembling the remaining stations in spring, the macroinvertebrate community present in

fall 2007 exhibited some notable contrasts. Of particular interest was that the Imboden Fork community shifted from one dominated by chironomids to one dominated by aquatic sowbugs (Asellidae). Aquatic sowbugs are able to do well in hyporheic habitats during drought conditions which, because this group was so numerous in fall 2007, suggest that Imboden Fork is smaller and perhaps more prone to low surface flow conditions than the remaining stations.

7.3.3 Black River Sample Stations

The macroinvertebrate community composition exhibited a few differences along the longitudinal gradient among Black River stations and also when compared to the coarse substrate portion of the East Fork samples. Chironomids, for example, were less abundant among Black River stations than most East Fork sites. Although differences existed in the overall coarse substrate quality among East Fork stations (e.g. event-related fine sediment observed in riffles downstream of the Lower Reservoir) it did not appear to result in a change to the chironomid diversity. Given that chironomids were present in roughly similar abundance in Black River stations both upstream and downstream of the East Fork confluence, it is unlikely that the East Fork is responsible for the disparity observed between systems. In addition, chironomids were approximately equal among Black River and East Fork stations in the fall due to a decreased abundance among most East Fork sites. Whereas East Fork Black River and other Biological Criteria Reference streams within the Ozark/Black/Current Ecological Drainage Unit have exhibited a similar pattern of seasonal chironomid abundance in past years, the Black River also has demonstrated a consistent pattern in 2006 and 2007. It is possible that chironomids simply exist in the Black River at a lower (but less variable) level compared to the smaller East Fork and reference streams.

One notable observation in fall 2007 macroinvertebrate community composition was the absence of the caddisfly *Helicopsyche* at Black River Station 2. This genus, which is acutely sensitive to organic pollution and has a Biotic Index value of 0 (Lenat 1993 as cited in MDNR 2005d), made up 4.3 percent of the Station 1 sample and 10.5 percent of the Station 3 sample. Given that *Helicopsyche* was the dominant caddisfly taxon at Station 3 and second to *Cheumatopsyche* at Station 1, it is curious that none appeared in the Station 2 sample. A similar pattern occurred, however, in both 2006 sample seasons, except that *Helicopsyche* was quite abundant at Station 3, but rare at both downstream Black River stations. The way in which *Helicopsyche* has been distributed in the past and the fact that it was present at Station 1 in numbers similar to the uppermost station may be rooted in natural population variability for this genus or possibly to some perturbation moving through the system to which it is particularly sensitive. Despite these macroinvertebrate community composition differences listed above, the overall Black River single habitat MSCI scores and each of its four biological metric components were quite good in 2007 and do not exhibit any drastic differences relative to the East Fork Black River confluence.

7.4 Data Trends

7.4.1 Water Quality

The most notable water quality data trend has involved changes in turbidity over time. Turbidity in the lower East Fork has ranged from 1-2 NTU beginning in September 2005 to >1000 NTU, observed in December 2005. Since that time, AmerenUE and its contractors have made efforts to improve the clarity of the lower East Fork by introducing flocculants to the Lower Taum Sauk Reservoir during the winter of 2006, removing sediment from the Lower Reservoir lake bed and upstream of the bin wall, as well as removing and managing sediment (via the river restoration project) along the East Fork reach within JSISP between Highway N and the shut-ins. By fall 2007, turbidity in the lower East Fork had decreased considerably compared to spring 2006, but remained higher than levels observed in fall 2005, prior to the Upper Reservoir breach. Lower Taum Sauk Reservoir continues to be a source of turbidity for the lower East Fork. During relatively low flow in fall 2007, turbidity of stations upstream of the Lower Reservoir were <1 NTU; however, downstream of the reservoir, where flow was higher due to water released from the dam, turbidity ranged between 5.42-10.20 NTU and tends to decrease while progressing downstream. Although turbidity in the lower East Fork continues to be elevated relative to pre-event conditions, effects to the Black River downstream of the East Fork confluence were minimal at base flow.

7.4.2 Biological Assessment

Among stations located downstream of the Lower Reservoir, Station 3 consistently has had the lowest MSCI scores and, until fall 2007, has failed to achieve a fully supporting score. During the 2005-2007 study period for which fall data are available, however, overall scores for Station 3 have increased in each successive year. Event-related sediment that covered much of the benthic substrate throughout the lower East Fork was especially thick among transects located in Station 3 (McCord 2006). Despite these sediment deposits, Station 3 biological metrics have increased over the past two sample seasons. In addition, Stations 1 and 2 have stayed relatively consistent over time during repeated fall seasons.

Since there are no pre-event lower East Fork spring samples for comparison, macroinvertebrate community composition trends for this reach will be difficult to assess. Rather than having a direct comparison, biological criteria multi-metric scores will be used in determining the point at which the various segments of this river reach have met the designated uses in Missouri's Water Quality Standards (MDNR 2005a). Stations 1 and 3 each achieved a partially-supporting score in spring 2006. At this time, the sediment present in the lower East Fork was newly-deposited and was at its thickest throughout the reach between the Lower Reservoir dam and the Black River confluence (pers. obs.). By the following spring 2007, the Station 1 MSCI score had improved

dramatically, whereas Stations 2 and 3 were unchanged. Station 2 had a fully-supporting MSCI score of 16 and Station 3 had a partially-supporting score of 12 in both years.

Instream flow will be an important contributing factor in the overall recovery of the lower East Fork Black River. As event-related fine sediment moves through the reach or becomes stabilized, benthic habitat will likely return to a state resembling conditions as they existed prior to the Upper Reservoir failure. Hrabik and Herzog (2009) observed instances of virtually dewatered riffle and run habitat when they conducted fish sampling surveys in June 2005. During their 2006 and 2007 surveys, they collected more fish species despite using a collection method that required lower sampling effort. They attribute this increased species richness to more water released through the Lower Reservoir dam that enabled fish to inhabit riffle and run areas. The same phenomenon would be true for macroinvertebrates and may explain the improvement in Station 3 MSCI scores and biological metric values observed in fall data between 2005 and 2007. Additional spring sampling is needed to determine whether cessation of upstream construction activity will have any effect on the macroinvertebrate community and whether the Station 3 spring MSCI score can improve in a manner similar to that observed in fall.

Station 6, the restored reach within JSISP, has some of the best pre-event macroinvertebrate community data available, which will be invaluable in assessing the efforts put forth in rehabilitating the aquatic resources of the East Fork Black River within the park. Despite the short amount of time between completion of the channel and our fall sample season, the MSCI score for this reach was quite encouraging. As the riparian corridor continues to improve and continued bedload and stream bank stabilization efforts progress, the potential exists for the macroinvertebrate community to approach its pre-event status over time.

7.4.3 Macroinvertebrate Quantitative Similarity Index

Based on the Quantitative Similarity Index trends, it appears that the macroinvertebrate community is gradually approaching a condition that existed prior to the Upper Reservoir failure. Stations 1 and 2, which were least affected by the breach, were more similar to the pre-event community in 2007 than any of the remaining stations. Station 6, which was compared to 2005 Station 4, had a much higher QSI in 2007 than 2006. Station 6 actually had a higher QSI than Station 3, which is somewhat surprising given the extreme conditions Station 6 had been exposed to and the relatively short amount of time between the introduction of flow to the new channel and the fall sample season. It is possible, given that Station 3 had relatively poor baseline diversity in fall 2005, that a more diverse macroinvertebrate community and higher biological metric scores would result in a lower QSI. This trend will likely continue if the macroinvertebrate scores at Station 3 maintain this upward trend.

8.0 Summary

1. Spring 2007 flow was much lower than spring 2006, whereas fall 2007 flows were considerably higher than either fall 2005 or 2006.

2. Turbidity readings were higher among stations located downstream of Lower Taum Sauk Reservoir than the remaining sites, with the exception of sample stations within JSISP during instream construction activities.

3. Of water quality nutrient parameters that were of detectable concentrations, Black River had higher levels than the East Fork or its tributaries.

4. Among lower East Fork stations, biological metrics tended to decrease as stations neared the dam. Station 3 achieved a partially supporting score in spring 2007, but was fully supporting in fall 2007.

5. Major construction activities were completed and the East Fork Black River was introduced into the restored reach in April 2007. As a result, Station 7 was excluded from flow and unavailable for sampling in fall 2007. Station 6 is located in the former Biological Criteria Reference reach, and represents the newly restored river reach. Station 6 was sampled for the first time in its new condition in fall 2007.

6. Among stations located upstream of the Lower Reservoir, stations located within JSISP upstream of the shut-ins achieved partially supporting status in spring (Stations 5 and 7) and fall 2007 (Stations 5 and 6).

7. Imboden Fork and Taum Sauk Creek, the East Fork tributary stations, both achieved fully supporting status in spring 2007.

8. Imboden Fork biological metrics experienced a decline in fall 2007 and a partially supporting ranking. The Imboden Fork macroinvertebrate community appears to fluctuate more in response to drought conditions than the upstream control (East Fork Station 8) or Taum Sauk Creek.

9. Each of the three Black River stations achieved a fully supporting single habitat score during both spring and fall 2007. Supportability rankings should be viewed as approximate because status was based on a single habitat method.

10. Among stations downstream of the Lower Reservoir, the macroinvertebrate community composition at East Fork Stations 1 and 2 was more similar to one another than to Station 3 during both seasons.

11. When comparing the macroinvertebrate community of fall 2007 with that of pre-event fall 2005, Station 3 continues to exhibit more differences than the remaining lower

East Fork stations. Differences that were the same as those observed in 2006 include: 1) increased diversity of chironomids (but unlike 2006, chironomid abundance decreased); 2) increased mayfly taxa richness in coarse substrate habitat with a decrease in the remaining habitats; 3) decreased abundance of caddisflies in coarse substrate habitat (but unlike 2006, caddisfly taxa richness increased in coarse substrate); 4) decreased caddisfly taxa richness and abundance in rootmat habitat.

12. Station 3 has exhibited more variability in MSCI scores compared to the remaining stations for which fall data are available. Station 3 MSCI scores have increased during each of the fall sampling events and the station achieved its first fully supporting score in fall 2007.

13. Each of the four EFBR stations for which pre-event data are available had a higher Quantitative Similarity Index in 2007 than 2006, indicating that the macroinvertebrate community appears to be tending toward a condition that existed prior to the Upper Reservoir failure.

9.0 Recommendations

1. Continue monitoring the East Fork Black River upstream of the Lower Taum Sauk Reservoir to document changes in the macroinvertebrate community of the restored reach within JSISP, with additional stations upstream and downstream of the park to verify whether possible seasonal variability (e.g. floods, droughts) affects the monitoring data.

2. Continue monitoring the East Fork Black River downstream of the Lower Taum Sauk Reservoir to determine effects of flood-related sediment scour and redistribution (Michaelson and Gullic 2008) on the macroinvertebrate community. Future monitoring also will assist in determining whether the increasing fall MSCI scores observed at Station 3 continues.

3. Discontinue single habitat sampling of the mainstem Black River. The East Fork Black River appears to have little effect on the water quality of the Black River during base flows and few differences in the macroinvertebrate community between stations upstream versus downstream of the confluence have been documented.

4. Discontinue water quality and macroinvertebrate sampling of Imboden Fork. This tributary, although having some of the best biological metrics of all sample stations during adequate flow conditions, is highly variable and does not provide sufficient quality “control” data to justify continued sampling.

5. Initiate a separate water quality and longitudinal macroinvertebrate community assessment of Taum Sauk Creek. The flow regime of this designated Outstanding State Resource Water will likely change in response to a new Upper Taum Sauk Reservoir that, unlike its predecessor, will contribute little to the creek’s base flow. In addition, Taum

Sauk Creek will be the receiving system for any potential Upper Reservoir overflows, due to the overflow release structure's location in proximity to the Taum Sauk Creek watershed.

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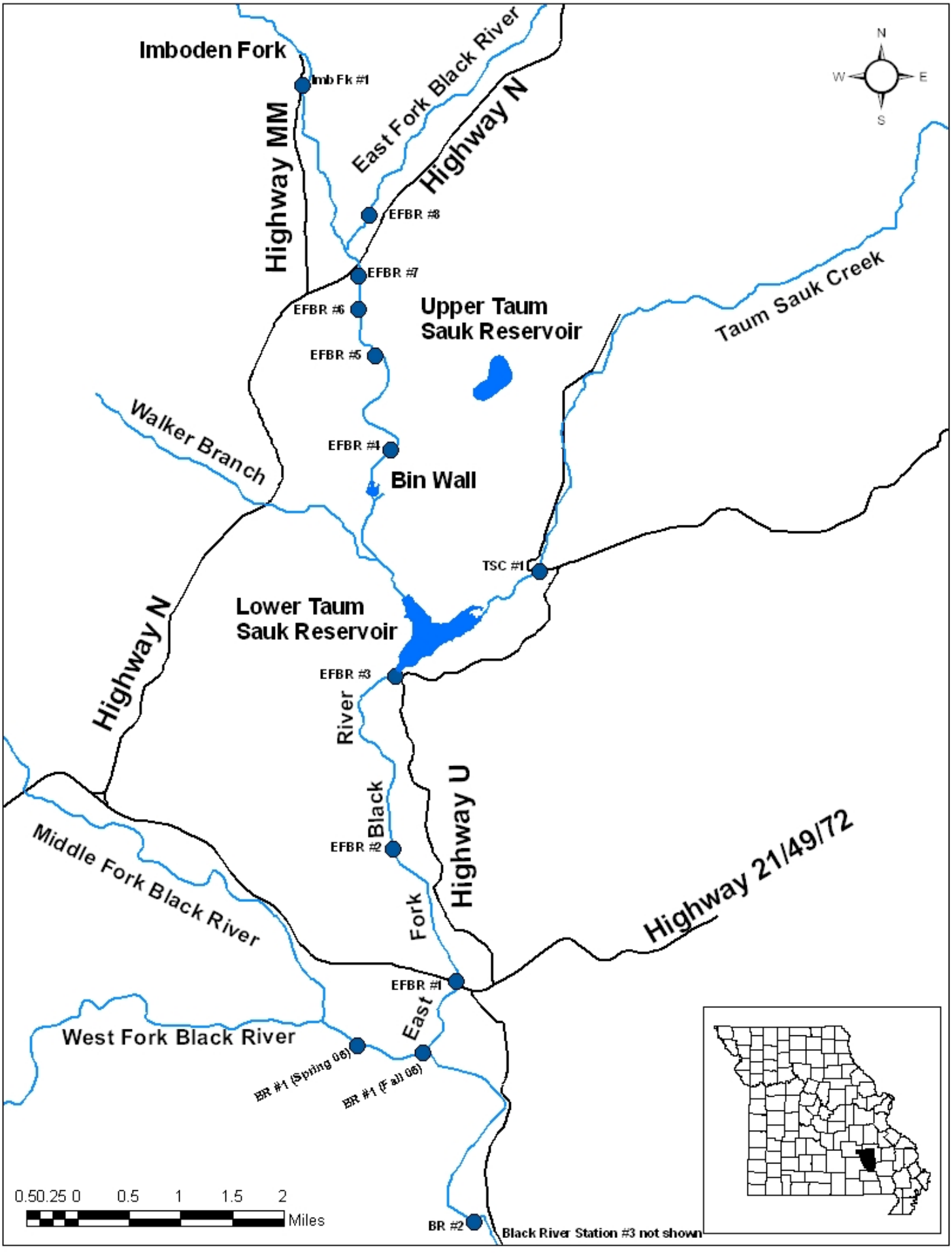
Appendix A

Maps

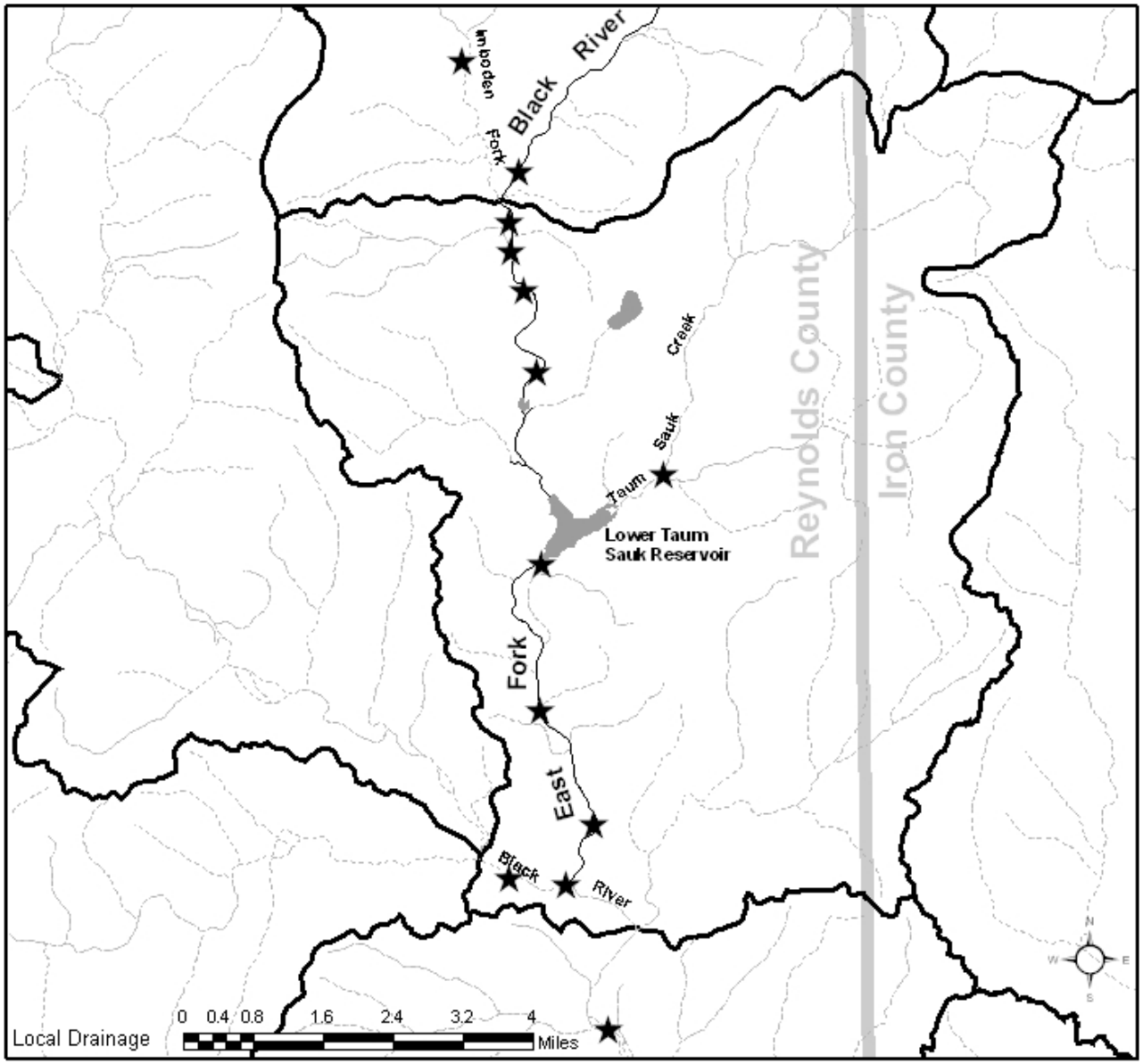
Sample Stations Located on the East Fork Black River, Its Tributaries, and the Black River
Ozark/Black/Current EDU

&

East Fork Black River Study Area
Ozark/Black/Current EDU


Imboden Fork
Imb Fk #1
East Fork Black River
Highway MM
Highway N
EFBR #8
EFBR #7
EFBR #6
EFBR #5
Upper Taum Sauk Reservoir
Taum Sauk Creek
Walker Branch
EFBR #4
Bin Wall
TSC #1
Highway N
Lower Taum Sauk Reservoir
EFBR #3
River
Black
EFBR #2
Fork
Highway U
Highway 21/49/72
Middle Fork Black River
EFBR #1
East
West Fork Black River
BR #1 (Spring 06)
BR #1 (Fall 06)
BR #2
Black River Station #3 not shown
N
W
E
S
0.50.25 0 0.5 1 1.5 2
Miles

East Fork Black River Study Site



Sampling Locations

County Boundary

Local Drainage

Stream/River

Local Drainage and Biologic Sampling Site Location

Ecolocial Drainage Unit (EDU) - An EDU is an area that contains a unique combination of habitats and organisms. Missouri is divided into 19 EDUs as shown in the inset map below. This site is located in the highlighted EDU.

Local Drainage - The local drainage area, also known as an 11 Digit Hydrologic Unit, is shown in the main map at left. This area is a portion of the local watershed. Missouri is split into over 350 such units.

Ecological Drainage Unit

Appendix B

Macroinvertebrate Taxa Lists

Black River

East Fork Black River

Imboden Fork

Taum Sauk Creek

Aquid Invertebrate Database Bench Sheet Report
Black R [0703201], Station #1, Sample Date: 3/13/2007 11:00:00 AM
CS = Coarse; -99 = Presence

ORDER: TAXA	CS
"HYDRACARINA"	
Acarina	12
COLEOPTERA	
Optioservus sandersoni	40
Psephenus herricki	1
Stenelmis	78
DIPTERA	
Antocha	1
Ceratopogoninae	1
Clinocera	1
Cricotopus bicinctus	1
Cricotopus/Orthocladius	13
Eukiefferiella	5
Hemerodromia	13
Hexatoma	5
Parametriocnemus	4
Polypedilum convictum	2
Potthastia	3
Pseudochironomus	1
Rheotanytarsus	2
Simulium	1
Stempellinella	9
Tabanus	1
Tanytarsus	3
Thienemannimyia grp.	1
EPHEMEROPTERA	
Acentrella	2
Anthopotamus	7
Caenis anceps	14
Caenis latipennis	3
Ephemerella invaria	143
Ephemerella needhami	2
Eurylophella bicolor	3
Heptageniidae	28
Isonychia bicolor	16
Maccaffertium bednariki	8
Maccaffertium mediopunctatum	8
Maccaffertium pulchellum	1
Rhithrogena	30
Stenacron	4
LEPIDOPTERA	
Petrophila	1
LUMBRICINA	
Lumbricina	15
MEGALOPTERA	

Aquid Invertebrate Database Bench Sheet Report
Black R [0703201], Station #1, Sample Date: 3/13/2007 11:00:00 AM
CS = Coarse; -99 = Presence

ORDER: TAXA	CS
Corydalus	1
ODONATA	
Argia	1
PLECOPTERA	
Leuctridae	2
Neoperla	1
Perlesta	10
TRICHOPTERA	
Ceratopsyche morosa grp	1
Cheumatopsyche	29
Chimarra	1
Helicopsyche	5
Oecetis	3
TRICLADIDA	
Planariidae	3

Aquid Invertebrate Database Bench Sheet Report
Black R [0703202], Station #2, Sample Date: 3/13/2007 12:20:00 PM
CS = Coarse; -99 = Presence

ORDER: TAXA	CS
N/A	
Gordiidae	1
"HYDRACARINA"	
Acarina	10
COLEOPTERA	
Optioservus sandersoni	32
Psephenus herricki	1
Stenelmis	80
DIPTERA	
Ceratopogoninae	1
Clinocera	1
Cricotopus/Orthocladius	12
Eukiefferiella brevicalcar grp	2
Hemerodromia	1
Hexatoma	2
Orthocladius (Euorthocladius)	2
Parametriocnemus	3
Polypedilum convictum	1
Simulium	4
Tabanus	2
Tanytarsus	14
EPHEMEROPTERA	
Acentrella	17
Anthopotamus	1
Caenis latipennis	1
Ephemerella invaria	245
Heptageniidae	29
Isonychia bicolor	40
Maccaffertium bednariki	3
Maccaffertium mediopunctatum	7
Maccaffertium pulchellum	2
Rhithrogena	42
LUMBRICINA	
Lumbricina	4
PLECOPTERA	
Amphinemura	1
Isoperla	3
Leuctridae	3
Neoperla	4
Perlesta	6
Strophopteryx fasciata	-99
TRICHOPTERA	
Ceratopsyche morosa grp	9
Cernotina	1
Cheumatopsyche	37

Aquid Invertebrate Database Bench Sheet Report
Black R [0703202], Station #2, Sample Date: 3/13/2007 12:20:00 PM
CS = Coarse; -99 = Presence

ORDER: TAXA	CS
Chimarra	1
Helicopsyche	1
Lepidostoma	1
TRICLADIDA	
Planariidae	10

Aquid Invertebrate Database Bench Sheet Report
Black R [0703203], Station #3, Sample Date: 3/13/2007 1:45:00 PM
CS = Coarse; -99 = Presence

ORDER: TAXA	CS
"HYDRACARINA"	
Acarina	27
COLEOPTERA	
Dubiraphia	1
Optioservus sandersoni	109
Stenelmis	49
DIPTERA	
Atherix	1
Ceratopogoninae	4
Cricotopus bicinctus	1
Cricotopus/Orthocladius	25
Eukiefferiella brevicalcar grp	2
Gonomyia	1
Hemerodromia	5
Microtendipes	2
Parametriocnemus	10
Potthastia	7
Prosimulium	6
Simulium	6
Stempellinella	3
Sympotthastia	2
Tabanus	1
Tanytarsus	16
Thienemannimyia grp.	6
EPHEMEROPTERA	
Acentrella	17
Anthopotamus	4
Caenis latipennis	5
Ephemerella invaria	187
Ephemerella needhami	5
Eurylophella bicolor	1
Heptageniidae	18
Isonychia bicolor	12
Maccaffertium mediopunctatum	7
Maccaffertium pulchellum	1
Rhithrogena	48
Stenacron	1
LUMBRICINA	
Lumbricina	1
MEGALOPTERA	
Corydalus	-99
PLECOPTERA	
Leuctridae	1
Neoperla	5
Perlesta	7

Aquid Invertebrate Database Bench Sheet Report
Black R [0703203], Station #3, Sample Date: 3/13/2007 1:45:00 PM
CS = Coarse; -99 = Presence

ORDER: TAXA	CS
Prostoia	2
Strophopteryx fasciata	2
TRICHOPTERA	
Ceratopsyche morosa grp	8
Cheumatopsyche	45
Helicopsyche	6
Oecetis	4
Polycentropodidae	1
TRICLADIDA	
Planariidae	6

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703204], Station #1, Sample Date: 3/14/2007 9:40:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina	8	7	17
AMPHIPODA			
Hyalella azteca			2
COLEOPTERA			
Dubiraphia	1	12	1
Microcylloepus pusillus	6	1	2
Optioservus sandersoni	7	1	
Psephenus herricki	8	2	
Stenelmis	96	4	
DECAPODA			
Orconectes hylas	1	-99	-99
DIPTERA			
Ablabesmyia		3	1
Cardiocladius	1	1	
Ceratopogoninae		26	3
Cladotanytarsus		2	
Clinocera	1		
Corynoneura	1		9
Cricotopus bicinctus	13		16
Cricotopus/Orthocladius	133	2	61
Cryptochironomus		12	
Dicrotendipes	1		2
Dixella			2
Djalmabatista		3	
Eukiefferiella brevicalcar grp	55		
Hemerodromia	5		
Labrundinia			12
Microtendipes		2	
Nanocladius	1		4
Orthocladius (Euorthocladius)	3		
Orthocladius (Symposiocladius)			1
Pagastiella		12	
Parachaetocladius		1	
Paracladopelma		8	
Parakiefferiella		32	4
Parametriocnemus	1	1	
Paratanytarsus	1	1	43
Phaenopsectra			2
Polypedilum aviceps	3		
Polypedilum illinoense grp			3
Potthastia		1	4
Prosimulium	6		
Psectrocladius			7
Rheocricotopus			2

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703204], Station #1, Sample Date: 3/14/2007 9:40:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Rheotanytarsus	14		3
Simulium	54		
Stempellina	1		
Stempellinella	3	7	1
Sympotthastia		1	2
Tabanus	1		
Tanytarsus	16	33	13
Thienemanniella	1		1
Thienemannimyia grp.	2	5	8
Tipula		-99	
Tribelos		1	
Tvetenia	1		
EPHEMEROPTERA			
Acentrella	6		
Acerpenna	1		
Caenis anceps	4	27	
Caenis latipennis	9	2	47
Centroptilum			3
Ephemera simulans		1	
Ephemerella invaria	5		1
Eurylophella			2
Eurylophella bicolor		2	
Heptageniidae	5	1	5
Isonychia bicolor	25		
Leptophlebia			-99
Leptophlebiidae			1
Maccaffertium mediopunctatum	23	1	
Maccaffertium pulchellum	1		
Siphlonurus			6
Stenacron		4	
Stenonema femoratum	4	3	3
Tricorythodes	4		
ISOPODA			
Lirceus	1		
LIMNOPHILA			
Ancylidae	1		1
Ferrissia			1
Helisoma			-99
Menetus			1
Physella			-99
LUMBRICINA			
Lumbricina		3	1
MEGALOPTERA			
Corydalus	1		
Sialis		-99	
ODONATA			

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703204], Station #1, Sample Date: 3/14/2007 9:40:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Argia		1	1
Calopteryx			2
Enallagma			5
Gomphus			1
Macromia			1
Stylogomphus albistylus		-99	
PLECOPTERA			
Amphinemura	24		
Chloroperlidae		1	
Helopicus nalatus	-99		
Hydroperla crosbyi	1		
Isoperla	5		
Leuctridae	1	3	
Neoperla	3		
Prostoia	4		
Strophopteryx fasciata	2		
TRICHOPTERA			
Agapetus	14		
Ceratopsyche morosa grp	1		
Cernotina			4
Cheumatopsyche	1		
Chimarra	2	-99	
Helicopsyche	1		
Hydroptila	1		
Oecetis	1		1
Oxyethira	1	1	21
Pycnopsyche			-99
Rhyacophila	1		
Triaenodes			2
TUBIFICIDA			
Ilyodrilus templetoni		2	
Limnodrilus claparedianus		1	
Limnodrilus hoffmeisteri		1	
Spirosperma	1	1	
Tubificidae		38	1
VENEROIDEA			
Corbicula	15	12	

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703205], Station #2, Sample Date: 3/14/2007 11:30:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina	7	1	16
AMPHIPODA			
Hyalella azteca			1
COLEOPTERA			
Dubiraphia		2	1
Laccobius			1
Macronychus glabratus	1		
Optioservus sandersoni	5		
Psephenus herricki	1		
Stenelmis	85	1	2
DECAPODA			
Orconectes hylas	1	-99	
DIPTERA			
Ablabesmyia		2	
Cardiocladius	3		
Ceratopogoninae		32	1
Chironomus		1	
Cladopelma		5	
Cladotanytarsus		5	
Clinocera	1	1	
Corynoneura			3
Cricotopus bicinctus			13
Cricotopus/Orthocladius	106	8	90
Cryptochironomus		21	
Dicrotendipes	1	6	6
Diptera		1	
Eukiefferiella	8		1
Harnischia		2	
Hemerodromia	4		
Labrundinia			1
Nanocladius			4
Orthocladius (Euorthocladius)	4		
Pagastiella		1	
Paracladopelma		1	
Parakiefferiella	1	27	9
Paralauterborniella		3	
Parametriocnemus	1		
Paratanytarsus	1	3	39
Polypedilum convictum		2	1
Polypedilum halterale grp		8	
Polypedilum illinoense grp			2
Procladius		11	
Prosimulium	19		1
Psectrocladius		1	12

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703205], Station #2, Sample Date: 3/14/2007 11:30:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Pseudochironomus		1	
Rheocricotopus	1		
Rheotanytarsus	33		4
Simulium	49		
Stempellinella	3	10	2
Stictochironomus		1	
Sympotthastia	1		3
Tabanus	2		
Tanytarsus	2	62	6
Thienemannimyia grp.	2	2	8
Tipula		-99	
Tvetenia	3		
Zavrelimyia			3
EPHEMEROPTERA			
Acentrella	11		
Acerpenna	1		
Caenis latipennis	62	7	44
Ephemera simulans		-99	
Ephemerella invaria	3		
Eurylophella	2		
Heptageniidae	5		
Hexagenia limbata		5	
Isonychia bicolor	65		
Maccaffertium mediopunctatum	25		
Maccaffertium pulchellum	8		
Stenacron	1		
Stenonema femoratum	7	3	1
Tricorythodes	9		
HEMIPTERA			
Corixidae		2	
Trepobates			1
ISOPODA			
Caecidotea (Blind & Unpigmented)			2
LIMNOPHILA			
Ancylidae	3		1
Helisoma			1
Menetus			6
LUMBRICINA			
Lumbricina	4	-99	
MEGALOPTERA			
Corydalus	2		
Nigronia serricornis	-99		
Sialis		1	
ODONATA			
Argia	1		

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703205], Station #2, Sample Date: 3/14/2007 11:30:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Boyeria	-99		
Calopteryx			3
Enallagma			1
Hetaerina			1
Macromia			1
Stylogomphus albistylus	3		
PLECOPTERA			
Amphinemura	8		
Helopicus nalatus	1		
Isoperla	1		
Leuctridae	2		2
Neoperla	4		
Perlesta	2		
Prostoia	1		
Strophopteryx fasciata	4		
TRICHOPTERA			
Agapetus	1		
Ceratopsyche morosa grp	1		
Cheumatopsyche	4		
Chimarra	1		
Helicopsyche	1		
Hydroptila	3		1
Oxyethira	8		9
Pycnopsyche			-99
Triaenodes	1		
TRICLADIDA			
Planariidae	3		1
TUBIFICIDA			
Limnodrilus hoffmeisteri		8	
Spirosperma		5	
Tubificidae	2	79	
VENEROIDEA			
Corbicula	32	11	

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703206], Station #3, Sample Date: 3/14/2007 1:30:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina	1	1	2
BRANCHIOBDELLIDA			
Branchiobdellida			1
COLEOPTERA			
Dubiraphia		1	1
Microcylloepus pusillus	4		
Stenelmis	376	1	
Tropisternus			-99
DECAPODA			
Orconectes hylas			-99
DIPTERA			
Ablabesmyia		12	2
Ceratopogoninae		15	
Chironomus		2	
Cladopelma		1	
Cladotanytarsus		16	
Clinotanypus		1	
Corynoneura		2	3
Cricotopus bicinctus		3	58
Cricotopus/Orthocladius	52	18	119
Cryptochironomus		1	
Cryptotendipes		1	
Dicrotendipes		3	4
Eukiefferiella	11	1	1
Hemerodromia	8	1	2
Micropsectra			4
Pagastiella		2	
Parakiefferiella		12	2
Parametriocnemus	4	1	
Paratanytarsus			19
Polypedilum convictum	1		
Polypedilum fallax grp			2
Polypedilum halterale grp		22	
Polypedilum illinoense grp			6
Potthastia	1		1
Procladius		71	3
Prosimulium	12		1
Psectrocladius		2	
Pseudochironomus		2	
Rheotanytarsus	1		
Simulium	2		
Stempellinella		3	
Sympotthastia			6
Tabanus	5		

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703206], Station #3, Sample Date: 3/14/2007 1:30:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Tanypus		3	
Tanytarsus	2	74	6
Thienemanniella	1		4
Thienemannimyia grp.	16	1	8
Tribelos	3	3	2
Tvetenia	1		
EPHEMEROPTERA			
Caenis anceps	20		
Caenis latipennis	1	3	
Ephemera simulans	1		
Isonychia bicolor	2		
Leptophlebia		2	
Maccaffertium mediopunctatum	2		
Maccaffertium pulchellum	7		
Stenacron	13		
Tricorythodes			1
ISOPODA			
Caecidotea	2		-99
LIMNOPHILA			
Menetus			2
LUMBRICINA			
Lumbricina	3		
MEGALOPTERA			
Sialis		1	
ODONATA			
Argia	3		
Enallagma			6
PLECOPTERA			
Acroneuria	-99		
Clioperla clio			1
Neoperla	46		
Strophopteryx fasciata	3		
TRICHOPTERA			
Cheumatopsyche	6		
Hydropsyche	1		
Oecetis	1	1	
TRICLADIDA			
Planariidae	7		-99
TUBIFICIDA			
Branchiura sowerbyi	1	4	
Spirosperma		1	1
Tubificidae	5	31	1
VENEROIDEA			
Corbicula	5	-99	

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703208], Station #4, Sample Date: 3/15/2007 9:30:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina	35	3	4
BRANCHIOBDELLIDA			
Branchiobdellida	1		
COLEOPTERA			
Dubiraphia	1	12	10
Helichus lithophilus			1
Lutrochus	1		
Microcylloepus pusillus			1
Optioservus sandersoni	46		
Psephenus herricki	4		
Stenelmis	28	2	
DECAPODA			
Orconectes hylas	1		1
DIPTERA			
Ablabesmyia		3	
Brillia		1	
Cardiocladius	1		
Ceratopogoninae	2	6	
Cladopelma		1	
Cladotanytarsus		13	
Clinocera	8		1
Corynoneura		3	3
Cricotopus bicinctus			16
Cricotopus/Orthocladius	51	41	97
Cryptochironomus		3	
Cryptotendipes		2	
Demicryptochironomus		1	
Dicrotendipes		1	
Eukiefferiella brevicalcar grp	63	3	4
Hemerodromia	8	3	2
Micropsectra	5		2
Microtendipes		2	
Ormosia	2		
Orthocladius (Euorthocladius)	2		2
Pagastiella		4	
Parakiefferiella		19	
Parametriocnemus	15	1	
Paratanytarsus		1	2
Paratendipes		9	
Phaenopsectra		4	
Polypedilum aviceps	4		
Polypedilum convictum	1		
Polypedilum fallax grp	1		
Polypedilum halterale grp	1	27	

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703208], Station #4, Sample Date: 3/15/2007 9:30:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Polypedilum illinoense grp	2	1	
Potthastia	22	36	1
Procladius		5	
Prosimulium	50		1
Psectrocladius		3	1
Rheocricotopus	2		1
Rheotanytarsus	7		8
Silvius	1		
Stempellinella	1	14	1
Stictochironomus		4	
Sympotthastia		1	2
Tabanus	-99		
Tanytarsus	8	34	2
Thienemanniella			18
Thienemannimyia grp.	7	11	9
Tipula	-99		
Zavrelimyia		1	
EPHEMEROPTERA			
Acentrella	55		3
Acerpenna			1
Baetisca lacustris			2
Caenis anceps	25	5	12
Caenis latipennis	12	6	45
Ephemerellidae	2		
Eurylophella bicolor		2	
Eurylophella enoensis			10
Heptageniidae	10	2	
Isonychia bicolor	23		
Leptophlebia			1
Maccaffertium mediopunctatum	11		
Maccaffertium pulchellum	4	1	2
Stenacron		1	
Stenonema femoratum	4	3	1
ISOPODA			
Caecidotea (Blind & Unpigmented)	1		
LEPIDOPTERA			
Petrophila	2		
LIMNOPHILA			
Physella			2
LUMBRICINA			
Lumbricina	15	1	
LUMBRICULIDA			
Lumbriculidae		2	
MEGALOPTERA			
Corydalus	1		

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703208], Station #4, Sample Date: 3/15/2007 9:30:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
ODONATA			
Argia	1		
Boyeria			3
Gomphidae	4	1	2
Hagenius brevistylus		1	
Stylogomphus albistylus	1		
PLECOPTERA			
Amphinemura	4		4
Helopicus nalatus	1		
Isoperla	20		
Leuctridae	3	2	
Neoperla	4		10
Prostoia	1		
Strophopteryx	4		
TRICHOPTERA			
Ceratopsyche morosa grp	1		
Cernotina	1		
Cheumatopsyche	21		
Chimarra	13		
Glossosomatidae	2		
Helicopsyche	7	1	
Hydroptila	2		59
Ironoquia			1
Oecetis	1		
Pycnopsyche			2
Triaenodes			1
TUBIFICIDA			
Enchytraeidae		2	
Limnodrilus hoffmeisteri	1	1	
Tubificidae		5	

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703209], Station #5, Sample Date: 3/15/2007 11:00:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina	8	10	2
COLEOPTERA			
Dubiraphia		1	5
Helichus lithophilus			1
Optioservus sandersoni	8	2	
Psephenus herricki	4		
Stenelmis	10		
DIPTERA			
Ceratopogoninae	3	14	
Cladotanytarsus		2	
Clinocera	4	9	1
Corynoneura	1	1	3
Cricotopus bicinctus	4		13
Cricotopus/Orthocladius	51	10	93
Diptera		2	
Eukiefferiella brevicalcar grp	64	13	4
Gonomyia	2	2	
Hemerodromia	3	5	1
Hexatoma	6		
Micropsectra	1		1
Orthocladius (Euorthocladius)	3		2
Parakiefferiella		3	
Parametriocnemus	2		
Paratanytarsus			3
Phaenopsectra		1	
Polypedilum aviceps	1		
Polypedilum convictum	1		
Polypedilum fallax grp	1		
Polypedilum halterale grp		1	
Potthastia	19	9	2
Procladius		1	
Prosimulium	265	1	13
Protoplasa fitchii	2		
Rheocricotopus		1	3
Rheotanytarsus	2		2
Simulium	3		
Stempellinella		2	
Sympotthastia	5	4	9
Tabanus	1		-99
Tanytarsus	1	3	1
Thienemanniella		1	14
Thienemannimyia grp.		5	11
undescribed Empididae	1	2	
EPHEMEROPTERA			

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703209], Station #5, Sample Date: 3/15/2007 11:00:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Acentrella	91		6
Acerpenna			2
Ameletus lineatus			1
Caenis anceps			6
Caenis latipennis		1	15
Eurylophella bicolor		1	
Eurylophella enoensis			7
Heptageniidae			1
Isonychia bicolor	3		-99
Leptophlebia			2
Stenonema femoratum	1	3	
HEMIPTERA			
Microvelia			1
ISOPODA			
Caecidotea (Blind & Unpigmented)	1		
Lirceus			1
LIMNOPHILA			
Physella			1
LUMBRICINA			
Lumbricina	11		
ODONATA			
Boyeria			2
Stylogomphus albistylus			1
PLECOPTERA			
Amphinemura	4		16
Chloroperlidae	1		
Clioperla clio			1
Isoperla	6		3
Leuctridae	1		
Perlesta			16
Prostoia	1		1
TRICHOPTERA			
Agapetus	4		
Ceratopsyche morosa grp	1		
Cheumatopsyche	5		
Chimarra	1		1
Hydroptila	1		54
Polycentropus	1		
Pycnopsyche			1
TRICLADIDA			
Planariidae			1
TUBIFICIDA			
Enchytraeidae		2	

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703210], Station #7, Sample Date: 3/15/2007 12:15:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina	3	4	1
COLEOPTERA			
Dubiraphia		2	3
Ectopria nervosa			1
Hydroporus			1
Optioservus sandersoni	4	2	
Paracymus			1
Scirtidae			1
Stenelmis		1	
DECAPODA			
Orconectes virilis			1
DIPTERA			
Ceratopogoninae		17	
Cladotanytarsus	1	4	
Clinocera	10	4	1
Corynoneura		2	19
Cricotopus bicinctus		1	13
Cricotopus/Orthocladius	9	33	76
Demicryptochironomus		2	
Dicrotendipes		1	2
Diptera			1
Dixella			1
Eukiefferiella brevicalcar grp	11		
Gonomyia		1	
Hemerodromia	1		
Heterotrissocladius			1
Labrundinia			5
Micropsectra		2	1
Ormosia			1
Orthocladius (Euorthocladius)	2		
Parakiefferiella		9	
Parametriocnemus	6	1	
Paratanytarsus			7
Polypedilum convictum	1		
Polypedilum fallax grp			1
Potthastia	12	32	11
Prosimulium	188	1	1
Psectrocladius		1	3
Rheocricotopus	1	1	4
Rheotanytarsus			6
Simulium	11		
Stictochironomus		2	
Sympotthastia	5	5	7
Tabanus		1	

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703210], Station #7, Sample Date: 3/15/2007 12:15:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Tanytarsus		8	4
Thienemanniella	2		13
Thienemannimyia grp.	5	6	17
Tvetenia bavarica grp	1		
Zavrelimyia			1
EPHEMEROPTERA			
Acentrella	46		5
Acerpenna	3		2
Ameletus lineatus			1
Caenis anceps		3	4
Caenis latipennis	1	4	27
Eurylophella bicolor		1	15
Heptageniidae		1	
Isonychia bicolor	4		1
Leptophlebia			3
Maccaffertium mediopunctatum	2		
Maccaffertium pulchellum			1
Siphlonurus			2
Stenacron		3	
Stenonema femoratum	2	4	9
ISOPODA			
Lirceus			1
LIMNOPHILA			
Physella			-99
ODONATA			
Argia			3
Calopteryx			1
Enallagma			1
Gomphidae			1
Hagenius brevistylus			2
Macromia		-99	
PLECOPTERA			
Acroneuria	1		
Amphinemura	4		
Clioperla clio			1
Helopicus nalatus	3		
Isoperla	7	1	1
Leuctridae	2	1	2
Perlesta			16
Strophopteryx fasciata			2
TRICHOPTERA			
Cheumatopsyche	1		
Chimarra	1		
Hydroptila		1	22
Oecetis		1	
Oxyethira			1

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703210], Station #7, Sample Date: 3/15/2007 12:15:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Pycnopsyche			4
TRICLADIDA			
Planariidae		1	
TUBIFICIDA			
Tubificidae		5	

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703211], Station #8, Sample Date: 3/20/2007 11:00:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina	30	1	12
AMPHIPODA			
Hyalella azteca			4
BRANCHIOBDELLIDA			
Branchiobdellida			1
COLEOPTERA			
Dubiraphia	1	9	
Optioservus sandersoni	20	1	
Paracymus		1	
Psephenus herricki	6	1	
Stenelmis	52		
DECAPODA			
Orconectes hylas			1
Orconectes virilis			-99
DIPTERA			
Ablabesmyia		5	2
Brillia			1
Ceratopogoninae		5	1
Cladotanytarsus		2	
Clinocera	3	2	
Corynoneura	1	34	28
Cricotopus bicinctus	3	1	8
Cricotopus/Orthocladius	31	20	23
Dicrotendipes			2
Diptera		1	
Eukiefferiella	60		10
Hemerodromia	2		
Labrundinia		2	12
Micropsectra	6	2	1
Microtendipes		1	
Orthocladius (Euorthocladius)	2		
Orthocladius (Symposiocladius)			1
Parakiefferiella		4	
Parametriocnemus	8	2	3
Paraphaenocladius			1
Paratanytarsus		1	3
Paratendipes		5	
Polypedilum	1		
Polypedilum convictum	3		1
Polypedilum fallax grp	4	7	1
Polypedilum scalaenum grp			1
Potthastia	6	14	2
Procladius		3	
Prosimulium	176		76

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703211], Station #8, Sample Date: 3/20/2007 11:00:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Psectrocladius		5	
Rheocricotopus	23		1
Rheotanytarsus			6
Simulium	34		39
Stempellinella	1	4	1
Sympotthastia			2
Tabanus	-99		
Tanytarsus	4	6	1
Thienemanniella			9
Thienemannimyia grp.	9	13	10
Tipula	1		1
Tribelos		4	
undescribed Empididae		1	
Zavrelimyia		2	
EPHEMEROPTERA			
Acentrella	66	1	5
Acerpenna	4		
Baetisca lacustris	1		
Caenis anceps		3	
Caenis latipennis	10	2	4
Centroptilum		1	2
Eurylophella bicolor	6	2	9
Isonychia bicolor	21		2
Leucrocuta	4		
Maccaffertium mediopunctatum	6		
Maccaffertium pulchellum	17	1	1
Stenacron		1	
Stenonema femoratum	1	13	1
LUMBRICINA			
Lumbricina	3		
LUMBRICULIDA			
Lumbriculidae	2	6	
MEGALOPTERA			
Corydalus	3		
Nigronia serricornis	1		
ODONATA			
Argia	1	2	
Gomphidae	1		
PLECOPTERA			
Amphinemura	13		15
Chloroperlidae	2		
Isoperla	3		
Leuctridae	43	9	3
Perlesta	3	1	7
Prostoia	1		
TRICHOPTERA			

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703211], Station #8, Sample Date: 3/20/2007 11:00:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Agapetus	8		
Ceratopsyche morosa grp	1		
Cheumatopsyche	21		1
Chimarra	6		
Helicopsyche	3		
Hydroptila			5
Oecetis	2	1	
Polycentropus	2	2	1
Pycnopsyche		1	1
TRICLADIDA			
Planariidae	3		
TUBIFICIDA			
Enchytraeidae	2		
VENEROIDEA			
Sphaeriidae		1	

Aquid Invertebrate Database Bench Sheet Report
Imboden Fk [0703212], Station #1, Sample Date: 3/20/2007 12:15:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina	6	1	
AMPHIPODA			
Gammarus			3
Stygobromus		-99	
COLEOPTERA			
Dubiraphia		2	
Ectopria nervosa		1	
Helichus basalis			1
Laccobius			1
Optioservus sandersoni	7		
Stenelmis		2	
DECAPODA			
Cambarus hubbsi	-99		
Orconectes hylas	1	-99	-99
DIPTERA			
Ablabesmyia		5	
Brillia			1
Ceratopogoninae	1	7	
Cladotanytarsus		2	
Clinocera	6	7	2
Corynoneura	1	11	11
Cricotopus bicinctus		1	
Cricotopus/Orthocladius	15	9	6
Dicrotendipes		1	3
Diptera		1	
Dixa			1
Eukiefferiella brevicalcar grp	14		
Hemerodromia			1
Hexatoma		1	
Labrundinia	1		6
Micropsectra	4	23	5
Microtendipes		3	
Natarsia		4	
Orthocladius (Euorthocladius)	3		
Orthocladius (Symposiocladius)	1		
Parakiefferiella		3	
Paramerina		1	3
Parametriocnemus	4	2	1
Paratanytarsus		1	3
Paratendipes		1	
Phaenopsectra		2	
Polypedilum aviceps	1		
Polypedilum convictum			1
Polypedilum fallax grp			1

Aquid Invertebrate Database Bench Sheet Report
Imboden Fk [0703212], Station #1, Sample Date: 3/20/2007 12:15:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Polypedilum halterale grp		1	
Polypedilum illinoense grp	1	1	2
Polypedilum scalaenum grp		1	
Potthastia	18	29	4
Procladius		1	
Prosimulium	48		
Psectrocladius	1	2	
Rheocricotopus	12	1	8
Simulium	29	1	2
Stempellinella	5	6	2
Sympotthastia	4		
Tabanus		2	
Tanytarsus	5	19	1
Thienemanniella	2		18
Thienemannimyia grp.	20	27	35
Tipula	-99		3
Tribelos		14	
Tvetenia bavarica grp	2		1
Zavrelimyia		16	4
EPHEMEROPTERA			
Acentrella	156		3
Acerpenna	11		
Ameletus			1
Caenis latipennis			2
Centroptilum			4
Eurylophella bicolor	4		
Eurylophella enoensis			10
Heptageniidae	24	4	
Isonychia bicolor	1		
Leptophlebia			8
Leptophlebiidae	3	1	1
Leucrocuta	2		
Maccaffertium mediopunctatum	1		
Maccaffertium pulchellum			1
Siphlonurus			1
Stenacron	1	1	
Stenonema femoratum	1	6	1
ISOPODA			
Lirceus	50	11	38
LIMNOPHILA			
Physella			1
LUMBRICINA			
Lumbricina	2	8	
LUMBRICULIDA			
Lumbriculidae	1	2	
ODONATA			

Aquid Invertebrate Database Bench Sheet Report
Imboden Fk [0703212], Station #1, Sample Date: 3/20/2007 12:15:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Enallagma			1
Gomphidae			1
Hetaerina			1
Libellulidae			1
Macromia			1
PLECOPTERA			
Acroneuria	1		
Amphinemura	53		46
Clioperla clio			6
Helopicus nalatus	1		
Isoperla	105	1	14
Leuctridae	9	17	4
Perlesta	7		6
Prostoia	5		3
TRICHOPTERA			
Agapetus	6		
Cernotina	1	4	
Helicopsyche	1		
Hydroptila	2	6	1
Polycentropus			2
Pycnopsyche			4
Rhyacophila	1		1
TRICLADIDA			
Planariidae			1
TUBIFICIDA			
Enchytraeidae	1	2	
Limnodrilus hoffmeisteri		4	
Tubificidae		5	
VENEROIDEA			
Sphaeriidae		3	

Aquid Invertebrate Database Bench Sheet Report
Taum Sauk Ck [0703207], Station #1, Sample Date: 3/14/2007 2:50:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
N/A			
Gordiidae		1	
"HYDRACARINA"			
Acarina	16		4
AMPHIPODA			
Stygobromus		2	
BRANCHIOBDELLIDA			
Branchiobdellida			3
COLEOPTERA			
Dubiraphia		2	
Optioservus sandersoni	2	1	1
Paracymus			1
Stenelmis			1
Tropisternus			-99
DECAPODA			
Orconectes hylas	-99	1	1
DIPTERA			
Ablabesmyia		1	
Ceratopogoninae		41	
Chaetocladius	1		
Cladotanytarsus		11	
Clinocera	20	7	4
Corynoneura	3	6	45
Cricotopus/Orthocladius	45	5	23
Demicryptochironomus	1		
Dicrotendipes		1	
Diplocladius			3
Djalmabatista		1	
Epoicocladius		1	
Eukiefferiella	14	2	4
Hemerodromia	1		
Hydrobaenus		1	2
Microtendipes		3	
Orthocladius (Euorthocladius)	5		
Parakiefferiella		11	1
Parametriocnemus	39	6	4
Paratanytarsus		1	1
Paratendipes		1	
Phaenopsectra		1	
Polypedilum convictum	7	1	4
Polypedilum fallax grp		1	
Polypedilum illinoense grp		1	
Procladius		5	
Prosimulium	76		
Protoplasa fitchii		1	

Aquid Invertebrate Database Bench Sheet Report
Taum Sauk Ck [0703207], Station #1, Sample Date: 3/14/2007 2:50:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Psectrocladius		2	
Rheocricotopus	20	7	69
Rheotanytarsus	1		1
Stictochironomus		9	
Sympotthastia	55	14	1
Tabanus	2		
Tanytarsus	7	12	1
Thienemanniella	4		11
Thienemannimyia grp.	5	9	2
Tipula			-99
Tribelos		12	
Tvetenia			3
Zavrelimyia		5	1
EPHEMEROPTERA			
Acentrella	36		
Ameletus lineatus			-99
Caenis	2	1	
Caenis anceps		3	
Caenis latipennis		15	2
Eurylophella		2	
Heptageniidae	2		1
Hexagenia		-99	
Isonychia bicolor			1
Leptophlebiidae	2		1
Maccaffertium pulchellum	2		
Maccaffertium vicarium	1		
Stenacron		1	
Stenonema femoratum		2	-99
ISOPODA			
Lirceus	1		1
LIMNOPHILA			
Physella			1
LUMBRICINA			
Lumbricina	7	4	
ODONATA			
Gomphidae		1	
PLECOPTERA			
Amphinemura	13		74
Chloroperlidae	4		
Clioperla clio			1
Isoperla	137	1	1
Leuctridae	12	15	11
Neoperla	1		
Perlesta			6
Strophopteryx fasciata	1		
Zealeuctra		2	

Aquid Invertebrate Database Bench Sheet Report
Taum Sauk Ck [0703207], Station #1, Sample Date: 3/14/2007 2:50:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
TRICHOPTERA			
Agapetus	6		
Chimarra	2		
Helicopsyche			2
Hydroptila	4	1	12
Lepidostoma			1
Platycentropus			-99
Polycentropus	3	1	
Psychomyiidae	2		
Pycnopsyche			-99
Triaenodes			2
TRICLADIDA			
Planariidae	1		
TUBIFICIDA			
Limnodrilus claparedianus		1	
Limnodrilus hoffmeisteri		3	
Tubificidae	1	62	6

Aquid Invertebrate Database Bench Sheet Report
Black R [0703217], Station #1, Sample Date: 9/17/2007 11:15:00 AM
CS = Coarse; -99 = Presence

ORDER: TAXA	CS
"HYDRACARINA"	
Acarina	47
COLEOPTERA	
Ectopria nervosa	1
Optioservus sandersoni	69
Psephenus herricki	4
Stenelmis	300
DIPTERA	
Chrysops	1
Cricotopus/Orthocladius	10
Eukiefferiella	4
Hexatoma	1
Microtendipes	5
Polypedilum convictum	24
Pseudochironomus	1
Rheotanytarsus	8
Simulium	1
Tabanus	1
Tanytarsus	5
Thienemannimyia grp.	2
EPHEMEROPTERA	
Acentrella	54
Anthopotamus	16
Baetis	17
Caenis anceps	9
Ephemerella invaria	1
Heptageniidae	26
Isonychia bicolor	51
Leucrocuta	38
Maccaffertium bednariki	34
Maccaffertium mediopunctatum	46
Rhithrogena	2
Serratella deficiens	1
Stenacron	2
Tricorythodes	20
LUMBRICINA	
Lumbricina	7
MEGALOPTERA	
Corydalus	2
ODONATA	
Argia	3
PLECOPTERA	
Acroneuria	-99
Neoperla	4
TRICHOPTERA	

Aquid Invertebrate Database Bench Sheet Report
Black R [0703217], Station #1, Sample Date: 9/17/2007 11:15:00 AM
CS = Coarse; -99 = Presence

ORDER: TAXA	CS
Cheumatopsyche	44
Chimarra	27
Helicopsyche	42
Hydroptila	1
Marilia	3
Nectopsyche	3
Oecetis	7
TRICLADIDA	
Planariidae	31
TUBIFICIDA	
Tubificidae	9
VENEROIDEA	
Sphaeriidae	2

Aquid Invertebrate Database Bench Sheet Report
Black R [0703218], Station #2, Sample Date: 9/17/2007 12:50:00 PM
CS = Coarse; -99 = Presence

ORDER: TAXA	CS
"HYDRACARINA"	
Acarina	23
COLEOPTERA	
Dubiraphia	1
Microcylloepus pusillus	5
Optioservus sandersoni	22
Psephenus herricki	3
Stenelmis	175
DECAPODA	
Orconectes hylas	1
DIPTERA	
Cricotopus/Orthocladius	4
Eukiefferiella	2
Polypedilum convictum	11
Pseudochironomus	1
Rheocricotopus	1
Rheotanytarsus	9
Simulium	10
Tabanus	2
Tanytarsus	8
Thienemanniella	2
EPHEMEROPTERA	
Acentrella	50
Anthopotamus	3
Baetis	33
Caenis anceps	3
Ephemerellidae	3
Heptageniidae	24
Isonychia bicolor	96
Leucrocuta	4
Maccaffertium bednariki	30
Maccaffertium mediopunctatum	25
Maccaffertium pulchellum	2
Rhithrogena	2
Stenacron	1
Tricorythodes	5
ISOPODA	
Caecidotea (Blind & Unpigmented)	1
LUMBRICINA	
Lumbricina	-99
MEGALOPTERA	
Corydalus	2
ODONATA	
Gomphidae	1

Aquid Invertebrate Database Bench Sheet Report
Black R [0703218], Station #2, Sample Date: 9/17/2007 12:50:00 PM
CS = Coarse; -99 = Presence

ORDER: TAXA	CS
Hagenius brevistylus	1
Hetaerina	1
PLECOPTERA	
Acroneuria	-99
Leuctridae	1
Neoperla	7
Pteronarcys pictetii	-99
TRICHOPTERA	
Cheumatopsyche	15
Chimarra	8
Oecetis	3
TRICLADIDA	
Planariidae	24
TUBIFICIDA	
Tubificidae	2

Aquid Invertebrate Database Bench Sheet Report
Black R [0703219], Station #3, Sample Date: 9/17/2007 1:40:00 PM
CS = Coarse; -99 = Presence

ORDER: TAXA	CS
"HYDRACARINA"	
Acarina	11
COLEOPTERA	
Dubiraphia	1
Ectopria nervosa	2
Optioservus sandersoni	128
Psephenus herricki	10
Stenelmis	166
DECAPODA	
Orconectes hylas	-99
DIPTERA	
Ceratopogoninae	1
Hemerodromia	2
Polypedilum convictum	7
Pseudochironomus	2
Rheotanytarsus	2
Tabanus	2
Tanytarsus	4
Thienemanniella	5
Thienemannimyia grp.	1
EPHEMEROPTERA	
Acentrella	18
Baetis	50
Heptageniidae	16
Isonychia bicolor	46
Leucrocuta	-99
Maccaffertium bednariki	6
Maccaffertium mediopunctatum	12
Rhithrogena	2
Stenacron	2
Tricorythodes	25
LIMNOPHILA	
Ancylidae	1
LUMBRICINA	
Lumbricina	7
MEGALOPTERA	
Corydalus	3
ODONATA	
Argia	5
Gomphidae	1
PLECOPTERA	
Neoperla	1
Perlesta	1
Perlinella drymo	1
Pteronarcys pictetii	-99

Aquid Invertebrate Database Bench Sheet Report
Black R [0703219], Station #3, Sample Date: 9/17/2007 1:40:00 PM
CS = Coarse; -99 = Presence

ORDER: TAXA	CS
TRICHOPTERA	
Ceratopsyche morosa grp	4
Cheumatopsyche	6
Chimarra	1
Helicopsyche	67
Marilia	4
Setodes	1
TRICLADIDA	
Planariidae	14
TUBIFICIDA	
Tubificidae	1

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703220], Station #1, Sample Date: 9/17/2007 3:15:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina	6	9	2
AMPHIPODA			
Hyalella azteca			6
COLEOPTERA			
Dubiraphia		25	8
Ectopria nervosa	1		
Helichus lithophilus			4
Macronychus glabratus			2
Microcylloepus pusillus	23	2	
Optioservus sandersoni	16		3
Psephenus herricki	49	8	
Stenelmis	102	8	1
DECAPODA			
Orconectes hylas			-99
DIPTERA			
Ablabesmyia		6	1
Ceratopogoninae	17	21	
Cladotanytarsus		1	
Clinotanypus		1	
Cricotopus/Orthocladius	4		1
Cryptochironomus		1	
Dicrotendipes	2		2
Djalmabatista		1	
Ephydridae	1		
Eukiefferiella	1		
Forcipomyiinae			1
Labrundinia			1
Pagastiella		2	
Parakiefferiella		5	
Paratanytarsus			3
Polypedilum convictum	6		
Polypedilum halterale grp		2	
Polypedilum illinoense grp	2		
Pseudochironomus	1		
Rheocricotopus	1		
Rheotanytarsus	16		2
Simulium	7		
Stempellinella	1	3	
Stenochironomus	1	1	2
Tabanus	-99	3	
Tanytarsus	5	4	5
Thienemanniella	1		
Thienemannimyia grp.	1		
EPHEMEROPTERA			

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703220], Station #1, Sample Date: 9/17/2007 3:15:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Acerpenna	9		
Baetis	5		
Baetiscidae	1		
Caenis anceps	29	37	3
Caenis latipennis		11	166
Choroterpes	6	11	
Ephemera simulans		3	
Eurylophella			2
Heptageniidae	14	2	1
Hexagenia limbata		3	
Isonychia bicolor	42		
Leucrocuta	1		
Maccaffertium mediopunctatum	22		
Maccaffertium pulchellum	5		
Procloeon	2	9	4
Stenacron	9	3	
Stenonema femoratum	32	43	6
Tricorythodes	8		3
ISOPODA			
Caecidotea	1		
Lirceus	9		1
LEPIDOPTERA			
Petrophila	2	1	1
LIMNOPHILA			
Ancylidae	5	1	1
Helisoma			-99
Menetus	2		2
LUMBRICINA			
Lumbricina	14	2	-99
MEGALOPTERA			
Corydalus	1		
ODONATA			
Argia	21	23	7
Boyeria			2
Calopteryx			4
Enallagma			11
Gomphidae	3		
Hetaerina			2
Ischnura		1	5
Libellula		2	
Macromia			-99
PLECOPTERA			
Neoperla	11		
TRICHOPTERA			
Cernotina		4	1
Cheumatopsyche	5		

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703220], Station #1, Sample Date: 9/17/2007 3:15:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Chimarra	18		
Helicopsyche	6		
Hydroptila	1		
Oecetis	1		2
Oxyethira		2	3
Polycentropus	1		
Triaenodes			8
TRICLADIDA			
Planariidae	3		
TUBIFICIDA			
Branchiura sowerbyi		1	
Spirosperma	7		
Tubificidae	8	65	
VENEROIDEA			
Corbicula	3		
Sphaeriidae	27	13	2

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703295], Station #2, Sample Date: 9/17/2007 4:30:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina	18	12	2
AMPHIPODA			
Hyalella azteca			2
COLEOPTERA			
Dubiraphia		12	2
Lutrochus	1		
Microcylloepus pusillus			1
Optioservus sandersoni	8		
Psephenus herricki	25	-99	
Stenelmis	133	1	1
DECAPODA			
Orconectes hylas	1		
DIPTERA			
Ablabesmyia	1	2	4
Ceratopogoninae	5	10	
Chrysops		1	
Cladopelma		2	
Cricotopus/Orthocladius	15		3
Cryptotendipes		11	
Dicrotendipes			1
Labrundinia			1
Nanocladius	2		1
Parakiefferiella	1	8	
Paratanytarsus		1	
Polypedilum convictum	2		
Polypedilum halterale grp		2	
Procladius		5	
Rheocricotopus	2		
Rheotanytarsus	8	1	2
Simulium	3		
Stempellinella		9	1
Stenochironomus			2
Tabanus	2		
Tanytarsus	3	10	3
Thienemanniella	1		1
Thienemannimyia grp.	2	2	
Tipula	1		
Tribelos			2
Zavrelimyia		1	
EPHEMEROPTERA			
Acerpenna	1		
Apobaetis		1	
Baetis	5		
Baetiscidae		2	

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703295], Station #2, Sample Date: 9/17/2007 4:30:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Brachycercus		1	
Caenis anceps	39	63	
Caenis latipennis	5	10	227
Centroptilum			1
Choroterpes	3	1	
Ephemera		-99	
Heptageniidae	36	2	
Hexagenia limbata		27	
Isonychia bicolor	52		
Maccaffertium bednariki	7		
Maccaffertium mediopunctatum	40		
Maccaffertium pulchellum	6		
Maccaffertium vicarium			1
Procloeon	2	5	6
Stenacron	11	3	
Stenonema femoratum	19	28	9
Tricorythodes	15	1	
ISOPODA			
Caecidotea	1		
LEPIDOPTERA			
Parapoynx			1
Petrophila	1		
LIMNOPHILA			
Ancylidae	2		1
Fossaria			1
Lymnaeidae		1	
Menetus			4
LUMBRICINA			
Lumbricina	6		
MEGALOPTERA			
Corydalus	3		
Sialis		1	
ODONATA			
Argia	28	9	2
Boyeria	1		-99
Calopteryx			1
Enallagma			15
Hagenius brevistylus		1	
Hetaerina			1
Libellula			1
Stylogomphus albistylus	4		
PLECOPTERA			
Acroneuria	1		
Leuctra	2		
Neoperla	19		
Perlesta	2		

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703295], Station #2, Sample Date: 9/17/2007 4:30:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
TRICHOPTERA			
Cernotina		8	
Cheumatopsyche	4		
Chimarra	35	1	
Dibusa angata	1		
Helicopsyche	8		
Hydroptila	1		
Oecetis			4
Oxyethira		1	
Polycentropus	2		1
Triaenodes			7
TRICLADIDA			
Planariidae	6	1	1
TUBIFICIDA			
Branchiura sowerbyi		5	
Tubificidae	7	15	
VENEROIDEA			
Corbicula	12		
Sphaeriidae	7		

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703296], Station #3, Sample Date: 9/18/2007 9:45:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina	2	18	3
AMPHIPODA			
Allocrangonyx		1	
Hyalella azteca		1	1
COLEOPTERA			
Berosus	1		
Dubiraphia		1	3
Paracymus			1
Psephenus herricki	4		
Scirtidae			6
Stenelmis	198		1
DECAPODA			
Orconectes hylas	2		
DIPTERA			
Ablabesmyia	2	7	3
Ceratopogoninae	1	27	3
Chironomus		1	
Cladopelma		21	
Cladotanytarsus		32	
Cricotopus/Orthocladius	2		5
Cryptochironomus		3	
Cryptotendipes		18	1
Dicrotendipes	1	3	
Epoicocladius		1	
Forcipomyiinae			2
Glyptotendipes	1		
Labrundinia		2	8
Microchironomus		1	
Nanocladius	1		2
Parachironomus	3	1	4
Parakiefferiella		9	
Paralauterborniella		1	
Paratanytarsus		1	9
Polypedilum	1	1	
Polypedilum convictum	3		
Polypedilum halterale grp		4	
Polypedilum illinoense grp	2	1	1
Procladius		10	
Rheotanytarsus	5	1	2
Simulium	3		
Stempellinella		1	
Stenochironomus	1		1
Tabanus	9		
Tanypus		2	

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703296], Station #3, Sample Date: 9/18/2007 9:45:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Tanytarsus	12	22	10
Thienemanniella			1
Thienemannimyia grp.	7		2
Zavrelimyia		9	1
EPHEMEROPTERA			
Acentrella			1
Acerpenna	1		
Apobaetis		6	
Baetis	1		
Caenis anceps	1		
Caenis latipennis	54	27	156
Choroterpes	6		1
Ephemera simulans	7		
Hexagenia limbata		35	
Isonychia bicolor	20		-99
Maccaffertium mediopunctatum	3		
Maccaffertium pulchellum	1		
Procloeon	6		6
Stenacron	12		
Stenonema femoratum	22		2
Tricorythodes	4		
HEMIPTERA			
Ranatra kirkaldyi			-99
Rheumatobates			1
Trepobates	1		
ISOPODA			
Lirceus	3		
LIMNOPHILA			
Ancylidae		1	2
Lymnaeidae			1
Menetus	6	4	39
Physella	2	1	3
LUMBRICINA			
Lumbricina	13	2	
MEGALOPTERA			
Corydalus	1		
Sialis	1	1	
ODONATA			
Argia	32		
Enallagma		6	22
Macromia			-99
Perithemis		1	
PLECOPTERA			
Acroneuria	2		
Neoperla	8		
Perlesta	1		

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703296], Station #3, Sample Date: 9/18/2007 9:45:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
TRICHOPTERA			
Cernotina	3	2	2
Cheumatopsyche	76		1
Chimarra	1		
Hydroptila		1	
Oecetis		5	4
Triaenodes	2		6
TRICLADIDA			
Planariidae	43	2	1
TUBIFICIDA			
Branchiura sowerbyi	1	28	1
Limnodrilus hoffmeisteri		1	
Spirosperma	4		
Tubificidae	10	19	1
UNIONIDA			
Unionidae	1		
VENEROIDEA			
Corbicula	45	5	1

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703298], Station #4, Sample Date: 9/18/2007 1:45:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina	19	10	1
AMPHIPODA			
Hyalella azteca			1
BRANCHIOBDELLIDA			
Branchiobdellida	14		1
COLEOPTERA			
Berosus		1	
Dubiraphia		16	13
Lutrochus	1		
Microcylloepus pusillus	2		5
Optioservus sandersoni	9	1	3
Paracymus		1	
Psephenus herricki	25	1	
Stenelmis	44	6	5
DECAPODA			
Orconectes hylas	2		-99
Orconectes virilis			1
DIPTERA			
Ablabesmyia		1	
Ceratopogoninae	2	23	1
Cladopelma		1	
Cladotanytarsus		12	
Cricotopus/Orthocladius	8		
Cryptochironomus		2	
Dicrotendipes		5	
Diptera			1
Djalmabatista		1	
Epoicocladius		2	
Eukiefferiella	4		
Gonomyia		1	
Hemerodromia	2		
Hexatoma	7		
Nanocladius	3	2	
Pagastiella		6	
Paralauterborniella		1	
Paratanytarsus	1	5	
Polypedilum	4		1
Polypedilum convictum	47		3
Polypedilum halterale grp		1	
Polypedilum illinoense grp	1	1	2
Polypedilum scalaenum grp	2	1	
Pseudochironomus		1	
Rheotanytarsus	71		20
Simulium	3		

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703298], Station #4, Sample Date: 9/18/2007 1:45:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Stempellina		3	
Stempellinella		3	3
Tanytarsus	7	13	4
Thienemanniella	3		
Thienemannimyia grp.	5	1	8
Zavrelimyia		1	
EPHEMEROPTERA			
Acentrella	11		
Acerpenna			2
Baetis	24		
Baetiscidae	1	1	
Brachycercus		1	
Caenis anceps	26	5	50
Caenis latipennis	50	97	148
Choroterpes	7	4	1
Heptageniidae	31		5
Hexagenia limbata		-99	
Isonychia bicolor	86		1
Leucrocuta	4		
Maccaffertium mediopunctatum	26		1
Maccaffertium pulchellum			1
Procloeon		12	2
Stenacron	6		
Stenonema femoratum	32	18	2
Tricorythodes	9		3
LEPIDOPTERA			
Petrophila	1		
LIMNOPHILA			
Physella		1	1
LUMBRICINA			
Lumbricina	3		1
MEGALOPTERA			
Corydalus	4		
ODONATA			
Argia	8	7	2
Boyeria			1
Enallagma		2	
Gomphidae	3		
Hagenius brevistylus		5	-99
Hetaerina			2
Macromia		-99	
Stylogomphus albistylus		-99	-99
PLECOPTERA			
Acroneuria	-99		
Leuctra	2	1	2
Neoperla	13	1	

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703298], Station #4, Sample Date: 9/18/2007 1:45:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
TRICHOPTERA			
Cheumatopsyche	47		
Chimarra	17		
Helicopsyche	21		
Limnephilidae			-99
Oecetis	3		
Polycentropodidae			1
Triaenodes			1
TRICLADIDA			
Planariidae	1		
TUBIFICIDA			
Branchiura sowerbyi		2	
Limnodrilus hoffmeisteri		3	
Tubificidae	1	48	2
VENEROIDEA			
Sphaeriidae	1	1	

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703299], Station #5, Sample Date: 9/18/2007 3:55:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina	13	25	
AMPHIPODA			
Hyalella azteca			1
COLEOPTERA			
Dubiraphia		10	7
Ectopria nervosa		3	
Macronychus glabratus			1
Microcylloepus pusillus		1	1
Optioservus sandersoni	5		
Psephenus herricki	37	7	
Stenelmis	8	2	1
DECAPODA			
Orconectes hylas			1
DIPTERA			
Ablabesmyia		5	
Ceratopogoninae	3	10	
Corynoneura		1	
Cricotopus/Orthocladius	2		1
Dicrotendipes		3	
Empididae	1		
Eukiefferiella		1	
Hemerodromia	1	1	
Paratanytarsus		2	
Paratendipes	1		
Polypedilum convictum	8	1	6
Polypedilum illinoense grp			1
Procladius			1
Rheocricotopus			1
Rheotanytarsus	14	5	50
Simulium	4		9
Stempellinella		8	
Tabanus	1	1	
Tanytarsus	6	9	6
Thienemannimyia grp.	1	7	1
EPHEMEROPTERA			
Acentrella	6		
Acerpenna	2		2
Baetis	4		4
Baetiscidae		1	1
Caenis anceps	24	52	33
Caenis latipennis	15	43	127
Choroterpes	1		
Heptageniidae	9	8	8
Isonychia bicolor	26		4

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703299], Station #5, Sample Date: 9/18/2007 3:55:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Leptophlebiidae	2	1	
Maccaffertium mediopunctatum	4		
Maccaffertium pulchellum	15		1
Procloeon		21	
Stenacron	6		
Stenonema femoratum	26	25	
Tricorythodes	2		5
HEMIPTERA			
Rhagovelia			1
ISOPODA			
Caecidotea (Blind & Unpigmented)	1		
Lirceus		1	
LEPIDOPTERA			
Petrophila	1	1	
LIMNOPHILA			
Menetus	1		
Physella		2	
LUMBRICINA			
Lumbricina	4		-99
ODONATA			
Argia	15	11	4
Boyeria			1
Calopteryx		1	
Enallagma		1	
Gomphidae	3		
Hagenius brevistylus		6	-99
Hetaerina			1
Macromia	1		1
Stylogomphus albistylus		1	
PLECOPTERA			
Leuctra	2		2
TRICHOPTERA			
Cheumatopsyche	10		5
Chimarra	5		5
Oecetis	3	2	1
Polycentropus	1		1
Triaenodes			2
TUBIFICIDA			
Tubificidae	1		

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703300], Station #6, Sample Date: 9/18/2007 5:00:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina	5	14	3
COLEOPTERA			
Berosus			1
Dubiraphia		12	11
Optioservus sandersoni	10	1	
Psephenus herricki	12	9	
Stenelmis	3	1	
DECAPODA			
Orconectes hylas	1		
DIPTERA			
Ablabesmyia			1
Ceratopogoninae		3	
Cladotanytarsus		4	
Cricotopus/Orthocladius	2		2
Cryptochironomus		1	
Dasyheleinae	1		
Dicrotendipes		1	
Eukiefferiella	2		
Forcipomyiinae			2
Hemerodromia	3		
Labrundinia	1		4
Parakiefferiella			2
Paratanytarsus		2	4
Polypedilum convictum	25		
Polypedilum illinoense grp			4
Pseudochironomus		1	
Rheocricotopus	1		
Rheotanytarsus	32	1	25
Simulium	5		
Stempellinella		9	1
Tabanus	2	-99	
Tanytarsus	15	5	23
Thienemanniella	1		
Thienemannimyia grp.	8	2	13
EPHEMEROPTERA			
Acentrella	25	2	
Acerpenna	15		2
Baetis	36		
Caenis anceps	32	63	71
Caenis latipennis	30	66	132
Centroptilum			1
Choroterpes		3	
Eurylophella bicolor			4
Isonychia bicolor	100		

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703300], Station #6, Sample Date: 9/18/2007 5:00:00 PM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Leptophlebiidae			1
Leucrocuta	1		
Maccaffertium mediopunctatum	35		
Maccaffertium pulchellum	139	2	1
Procloeon	2	21	3
Stenacron	6	8	
Stenonema femoratum	8	37	
Tricorythodes	4		
LIMNOPHILA			
Ancylidae	1		
Physella	1	5	
MEGALOPTERA			
Corydalus	3		
ODONATA			
Argia	4	13	
Calopteryx			1
Enallagma			2
Gomphidae	2	2	
Hetaerina			2
Macromia		1	-99
Stylogomphus albistylus		2	
PLECOPTERA			
Zealeuctra	2	1	
TRICHOPTERA			
Cheumatopsyche	51		
Chimarra	38		
Oecetis	1		1
Polycentropodidae		2	
TUBIFICIDA			
Tubificidae	1	1	1

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703301], Station #8, Sample Date: 9/19/2007 9:20:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina	2	3	3
AMPHIPODA			
Hyalella azteca			9
BRANCHIOBDELLIDA			
Branchiobdellida	8		1
COLEOPTERA			
Dubiraphia		8	18
Macronychus glabratus			1
Microcylloepus pusillus	2		
Neoporus			1
Optioservus sandersoni	23		
Psephenus herricki	72	12	1
Stenelmis	30	14	3
DECAPODA			
Cambarus hubbsi	-99		
Orconectes hylas	3		-99
Orconectes virilis			1
DIPTERA			
Ablabesmyia		4	3
Ceratopogoninae	1	1	2
Chironomus			1
Chrysops	1		
Cladotanytarsus	1	4	1
Corynoneura	1	4	4
Cricotopus/Orthocladius	5		3
Dicrotendipes		2	2
Diptera	1		1
Dixella			2
Eukiefferiella	1		
Forcipomyiinae		1	
Labrundinia		1	4
Parachironomus		1	
Parakiefferiella		2	
Parametriocnemus		1	
Paratanytarsus		3	21
Polypedilum convictum	29		1
Polypedilum illinoense grp			5
Potthastia			1
Rheocricotopus	1		
Rheotanytarsus	13		14
Simulium	5		
Stempellinella	2	10	3
Tanytarsus		14	27
Thienemannimyia grp.	3		4

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703301], Station #8, Sample Date: 9/19/2007 9:20:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Tribelos		2	2
Zavrelimyia	1	2	3
EPHEMEROPTERA			
Acentrella	26	1	
Acerpenna	5		
Baetis	23		
Baetiscidae	3	7	
Caenis anceps	22	60	27
Caenis latipennis	3	25	64
Ephemerellidae	2	7	2
Heptageniidae	47	4	
Isonychia bicolor	89		
Leptophlebiidae	2	3	4
Leucrocuta	3		
Maccaffertium mediopunctatum	21		
Maccaffertium pulchellum	31		
Procloeon		16	19
Stenacron	10	8	2
Stenonema femoratum	9	37	3
Tricorythodes	1		
ISOPODA			
Caecidotea (Blind & Unpigmented)	5		
Lirceus	4	4	4
LIMNOPHILA			
Helisoma			1
Lymnaeidae			1
LUMBRICINA			
Lumbricina	4		1
MEGALOPTERA			
Corydalus	3		
ODONATA			
Argia	6	19	3
Calopteryx			3
Enallagma			5
Gomphidae	11	9	1
Hagenius brevistylus		2	-99
Helocordulia			2
Macromia			1
Stylogomphus albistylus		1	2
PLECOPTERA			
Leuctra	3		
Neoperla	1		
Zealeuctra	9		5
TRICHOPTERA			
Ceratopsyche morosa grp	1		

Aquid Invertebrate Database Bench Sheet Report
East Fk Black R [0703301], Station #8, Sample Date: 9/19/2007 9:20:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Cheumatopsyche	116		
Chimarra	9		
Helicopsyche	1		
Phryganeidae			3
Polycentropodidae	2		
Triaenodes			2
TRICLADIDA			
Planariidae	2	1	3
TUBIFICIDA			
Branchiura sowerbyi	4		
Tubificidae	3	1	15
VENEROIDEA			
Sphaeriidae			1

Aquid Invertebrate Database Bench Sheet Report
Imboden Fk [0703302], Station #1, Sample Date: 9/19/2007 10:45:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina		3	1
AMPHIPODA			
Gammarus			14
Hyalella azteca			39
Stygobromus	2	1	
BRANCHIOBDELLIDA			
Branchiobdellida	1		
COLEOPTERA			
Dubiraphia		2	17
Ectopria nervosa	2	3	
Helichus basalis	1		
Hydroporus			1
Optioservus sandersoni	8	3	1
Psephenus herricki	130	25	
Scirtidae			1
Stenelmis	9	3	2
DECAPODA			
Orconectes hylas	8	-99	-99
DIPTERA			
Ablabesmyia		1	2
Cladotanytarsus	1		
Cricotopus/Orthocladius	10	1	
Dicrotendipes		2	6
Hemerodromia	1		
Paratanytarsus			3
Polypedilum convictum	17		2
Polypedilum illinoense grp		1	
Procladius		1	
Rheotanytarsus			1
Stempellinella		3	
Stictochironomus		1	
Tabanus		-99	
Tanytarsus	2	2	1
Thienemanniella			1
Thienemannimyia grp.	3	1	1
Tribelos		2	1
undescribed Empididae			1
Zavrelimyia		1	2
EPHEMEROPTERA			
Acentrella	15		
Caenis anceps		26	1
Caenis latipennis		15	4
Choroterpes	1	3	
Ephemerellidae		2	

Aquid Invertebrate Database Bench Sheet Report
Imboden Fk [0703302], Station #1, Sample Date: 9/19/2007 10:45:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Heptageniidae	6	6	1
Isonychia bicolor	1		
Leptophlebiidae		50	5
Procloeon		1	11
Stenacron	2	19	
Stenonema femoratum	6	68	5
ISOPODA			
Caecidotea (Blind & Unpigmented)	39	1	2
Lirceus	342	38	
LIMNOPHILA			
Physella			1
LUMBRICINA			
Lumbricina	8	6	
MEGALOPTERA			
Corydalus	1		
Sialis		2	
ODONATA			
Argia	1	6	
Calopteryx			6
Enallagma			7
Gomphidae	2	2	
Helocordulia		2	
Ischnura			1
Stylogomphus albistylus	1	-99	
PLECOPTERA			
Acroneuria	1		
Leuctra	8	1	
TRICHOPTERA			
Cheumatopsyche	2		
Chimarra	4		
Polycentropus	9	7	1
TRICLADIDA			
Planariidae	3		
TUBIFICIDA			
Tubificidae	5	10	

Aquid Invertebrate Database Bench Sheet Report
Taum Sauk Ck [0703297], Station #1, Sample Date: 9/18/2007 11:15:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
"HYDRACARINA"			
Acarina	7	3	19
AMPHIPODA			
Gammarus			1
Hyalella azteca		1	14
Stygobromus	1	1	
BRANCHIOBDELLIDA			
Branchiobdellida	1		
COLEOPTERA			
Dubiraphia		4	10
Helichus lithophilus			1
Hydroporus			1
Optioservus sandersoni	10		1
Psephenus herricki	71		1
Stenelmis	3		2
DECAPODA			
Orconectes hylas	9	-99	
Orconectes virilis			-99
DIPTERA			
Ablabesmyia		7	
Apedilum			1
Ceratopogoninae		3	
Chironomus	3	5	
Chrysops		2	
Corynoneura	1		
Cricotopus/Orthocladius	16	2	
Dicrotendipes	1		6
Djalmabatista		1	
Hexatoma	1		
Labrundinia			1
Microtendipes		1	
Parametriocnemus	3		
Paratanytarsus			1
Polypedilum	1		2
Polypedilum convictum	10		1
Polypedilum illinoense grp	1		
Procladius		2	
Rheocricotopus	1		
Rheotanytarsus	1		
Stictochironomus	2	1	2
Tabanus	5		
Tanytarsus	4	11	
Thienemannimyia grp.	5	3	5
Tribelos	1	1	
Zavrelimyia			2

Aquid Invertebrate Database Bench Sheet Report
Taum Sauk Ck [0703297], Station #1, Sample Date: 9/18/2007 11:15:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
EPHEMEROPTERA			
Acerpenna	4		
Baetis	1		
Caenis anceps	87	97	4
Caenis latipennis	2	73	62
Callibaetis			2
Centroptilum			2
Choroterpes	1	1	
Ephemerella needhami		1	
Eurylophella	1		2
Heptageniidae	69	10	1
Hexagenia limbata		-99	
Isonychia bicolor	22		
Leptophlebiidae		8	23
Leucrocuta	8		
Maccaffertium mediopunctatum	1		
Maccaffertium pulchellum	17		
Maccaffertium vicarium	3		
Paraleptophlebia	12		
Stenacron	20		
Stenonema femoratum	26	13	3
Tricorythodes	7		1
HEMIPTERA			
Microvelia			1
ISOPODA			
Caecidotea (Blind & Unpigmented)	8		
Lirceus	4		4
LEPIDOPTERA			
Petrophila	3		
LIMNOPHILA			
Menetus			13
Physella			1
LUMBRICINA			
Lumbricina	16		
MEGALOPTERA			
Corydalus	4		
Nigronia serricornis	3		
Sialis		-99	
ODONATA			
Argia	19	2	7
Calopteryx	1		1
Enallagma		1	12
Gomphidae	14		1
Gomphus		-99	
Helocordulia		-99	1

Aquid Invertebrate Database Bench Sheet Report
Taum Sauk Ck [0703297], Station #1, Sample Date: 9/18/2007 11:15:00 AM
CS = Coarse; NF = Nonflow; RM = Rootmat; -99 = Presence

ORDER: TAXA	CS	NF	RM
Libellula			1
Libellulidae		1	
Stylogomphus albistylus	6	-99	
PLECOPTERA			
Acroneuria	2		
Leuctra	28		6
Neoperla	1		
Zealeuctra	4		
TRICHOPTERA			
Cheumatopsyche	4		
Chimarra	3		
Helicopsyche	16		2
Mystacides		1	1
Oecetis		1	
Polycentropus	13		3
Pycnopsyche			2
Triaenodes			26
TRICLADIDA			
Planariidae	10	1	1
TUBIFICIDA			
Tubificidae	22	11	3
VENEROIDEA			
Sphaeriidae			1